

Isolated CD4+ T cells defined by CMRF-35 and CD45RO**BACKGROUND OF THE INVENTION****5 FIELD OF THE INVENTION**

The present invention relates generally to a method for the treatment or prophylaxis of a condition which provokes, or is exacerbated by, an immunological response. The present invention further enables methods of diagnosis of conditions which provoke, or are
10 exacerbated by, an immunological response. The present invention further provides therapeutic and diagnostic agents for conditions which provoke, or are exacerbated by, an immunological response. The present invention further provides compositions of cells defining a sub-population of T-cells.

15 DESCRIPTION OF THE PRIOR ART

Reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that that prior art forms part of the common
20 general knowledge in any country.

Bibliographic details of the publications referred to in this specification are also collected
at the end of the description.

The immune system represents a complex interaction between a large number of
25 components. T-cells are one crucial component of the immune system. T-cell activation is required for all specific responses against infectious agents and T-cells play an important role in tumor immunity and in autoimmune and allergic diseases. Helper T-cells are also involved in generating a humoral response. T-cell activation is initiated when T-cells recognize a specific antigen in the context of a major histocompatibility complex (MHC)
30 molecule. T-cell activation is characterized by a range of biochemical events including

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cytokine synthesis and induction of various activation markers such as CD25 (interleukin-2 [IL-2] receptor). CD4⁺ T-cells recognize their immunogenic peptides as MHC Class II molecules whereas CD8⁺ T-cells recognize their immunogenic peptides as MHC Class I molecules.

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Surface molecules play an important role with respect to T-cell function. Although antigen presentation represents a primary signal for T-cell incubation, cytokine synthesis and effector function requires additional secondary signalling.

- 10 The CMRF-35 family of molecules is an expanding group of Ig superfamily leucocyte surface molecules. The prototype members of this family are CMRF-35A and CMRF-35H (Jackson *et al*, *Eur J Immunol* 22: 1157-1163, 1992; Green, *et al*, *Int Immunol* 10:891-899, 1998.). The molecules are characterized by a single Ig V-like domain which are 80% similar at the amino acid sequence level. CMRF-35A has a glutamic acid in the
- 15 transmembrane region and CMRF-35H has three immuno-tyrosine inhibitory motifs (ITIM) in its cytoplasmic sequence of which at least one is functional (Cantoni, *et al*, *Eur J Immunol* 29:3148-3159, 1999). The CMRF-35 molecules are encoded by individual genes localized to a complex on human chromosome 17 (Clark, *et al*, *Tissue Antigens* 55:101-109, 2000; Clark, *et al*, *Tissue Antigens* 57:415-423, 2001; Speckman, *et al*, *Hum Genet*
- 20 112:34-41, 2003).

- The functions of members of this gene family are presently unknown as are their biological ligands. As members of the Ig superfamily with the capacity to signal through the presence of ITIM motifs or association with adaptor molecules, it is likely that the CMRF-35
- 25 molecules are involved in the regulation of the immune response. The recent linking of a psoriasis susceptibility gene to the CMRF-35 gene complex indicates the importance of these molecules in inflammatory disease processes (Speckman, *et al*, *Hum Genet* 112:34-41, 2003).

- 30 The CMRF-35A and CMRF-35H molecules are identified by the CMRF-35 monoclonal antibody (mAb) (Daish *et al*, *Immunology* 79:55-63, 1993) and are expressed by most

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leucocytes including monocytes, granulocytes, dendritic cells and NK cells.

In accordance with the present invention, it has been surprisingly determined that
CMRF-35 mAb defines a sub-population of T-cells involved in a range of immunological
5 responses.

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SUMMARY OF THE INVENTION

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will
 5 be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

Nucleotide and amino acid sequences are referred to by a sequence identifier number (SEQ ID NO:). The SEQ ID NOs: correspond numerically to the sequence identifiers <400>1
 10 (SEQ ID NO:1), <400>2 (SEQ ID NO:2), etc. A summary of the sequence identifiers is provided in Table 1. A sequence listing is provided after the claims.

CMRF-35A and CMRF-35H are leucocyte surface proteins which belong to a larger family of immunoregulatory molecules localized to human chromosome 17. The CMRF-
 15 35A and H molecules are identified by the CMRF-35 mAb which binds to a functional epitope expressed on most human leucocyte populations with the exception of B-cells and some T-cells. In accordance with the present invention, novel populations of T-cells are identified by the CMRF-35 mAb. Whilst CMRF-35 binds to all CD8⁺ T-cells, in accordance with the present invention, the antibody identifies novel CD4⁺ T-cells sub-
 20 populations. The sub-populations of T-cells are defined based on level of CMRF-35 mAb binding (CMRF-35⁺, CMRF-35⁺⁺ or CMRF-35⁻) in combination with the presence, absence or level of CD45RO. Five sub-populations of CD4⁺ T-cells are identified in accordance with the present invention as follows:

25 CMRF-35⁺⁺ CD45RO⁺;
 CMRF-35⁺ CD45RO⁺;
 CMRF-35⁻ CD45RO⁺
 CMRF-35⁺ CD45RO⁻; and
 CMRF-35⁻ CD45RO⁻.

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In a particularly preferred embodiment, the CMRF-35⁺⁺ CD45RO⁺ cells are also CXCR3⁺.

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RT-PCR shows that both CMRF-35A and CMRF-35H mRNA are expressed in the CMRF-35⁺. In addition, the CMRF-35⁻ population of T-cell expresses intracellular CMRF-35 molecules. The CMRF-35 mAb binds to a functional epitope and the CMRF-35⁻ fraction of T-cells proliferates to a greater extent than the CMRF-35⁺ CD4⁺ T-cell population in response to PMA/ionomycin and in the context of an allogeneic mixed lymphocyte reaction (MLR). The lack of proliferation is not associated with a lack of IL-2 mRNA. CMRF-35⁺ CD4⁺ cell, express more IFN γ mRNA following *in vitro* activation of resting peripheral blood T-cells than the CMRF-35⁻CD4⁺ cells and this is reflected in a greater number of cells producing intracellular protein. The lack of proliferation is the result of increased apoptosis in the CMRF-35⁺ population in response to PMA/ionomycin activation and not a block in cell cycle. Thus, CMRF-35 mAb identifies a novel T-cell sub-population and signaling through CMRF-35 A and CMRF-35 H these molecules have the capacity to regulate the T-cell response.

Of the CD4⁺ sub-populations of T-cells, the CMRF-35⁺⁺ CD45RO⁺ and more particularly, CMRF-35⁺⁺ CD45RO⁺ CXCR3⁺ sub-populations are particularly important. For example, in psoriasis, these populations are absent from peripheral blood. This indicates a role of these sub-populations of T-cells in psoriasis and potentially other inflammatory conditions or conditions which provoke or which are exacerbated by an immunological response.

The present invention provides, therefore, in one embodiment, the identification of a sub-population of T-cells which population comprises CD4⁺ T-cells and cells selected from:

CMRF-35⁺⁺ CD45RO⁺;
CMRF-35⁺ CD45RO⁺;
CMRF-35⁻ CD45RO⁺
CMRF-35⁺ CD45RO⁻; and
CMRF-35⁻ CD45RO⁻.

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In a particularly preferred embodiment, the present invention identifies a sub-population of T cells which population comprises $CD4^{+}$ T cells which are $CMRF-35^{++}$ $CD45RO^{+}$ $CXCR3^{+}$.

- 5 The identification of these new T-cell populations enables these populations to be specifically targeted for depletion, modification or upregulation.

The identification of these sub-populations of T-cells further enables diagnostic agents to be developed in the assessment of conditions which provoke an immune response or which
10 are exacerbated by an immune response.

Accordingly, another aspect of the present invention contemplates a method for identifying a population of T-cells, said method comprising obtaining a sample comprising $CD4^{+}$ T-cells and subjecting said $CD4^{+}$ T-cells and subjecting said $CD4^{+}$ T-cells to surface
15 marker discrimination means on the basis of levels, presence or absence of CMRF-35 epitope and CD45RO marker and optionally CXCR3.

Such a method is useful in the diagnosis of a particular condition or in deciding an appropriate therapeutic protocol.
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Conditions contemplated herein include autoimmune disorders (e.g diabetes) inflammation (e.g. arthritis, psoriasis), graft *versus* host disease, cancer and infection by pathogenic agents among many others.

- 25 The terms "T-cells" and "T-lymphocytes" are used interchangeably throughout the specification.

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Table 1:
Summary of Sequence Identifiers

SEQ ID NO.	Description
1	Nucleotide sequence of primer for β -actin sense.
2	Nucleotide sequence of primer for β -actin anti-sense.
3	Nucleotide sequence of primer for IL-2 sense.
4	Nucleotide sequence of primer for IL-2 anti-sense.
5	Nucleotide sequence of primer for IL-4 sense.
6	Nucleotide sequence of primer for IL-4 anti-sense.
7	Nucleotide sequence of primer for IL-10 sense.
8	Nucleotide sequence of primer for IL-10 anti-sense.
9	Nucleotide sequence of primer for IFN γ sense.
10	Nucleotide sequence of primer for IFN γ anti-sense.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a graphical representation showing dot blot analysis. Human PBMC were isolated and labeled with CMRF-35 and SAM-PE followed by CD4-PerCP, CD45RO-APC and CCR7-FITC or CXCR3-FITC. The dot plots show staining of the CMRF-35 mAb and CD45RO (A), CCR7 (B) or CXCR3 (C) on the cells within the CD4⁺ lymphocyte gate. In (D), cord blood mononuclear cells were isolated and labeled with CMRF-35 and SAM-PE followed by CD4-PerCP, CD45RO-APC. The dot plot shows staining of the CMRF-35 mAb and CD45RO on cells within the CD4⁺ lymphocyte gate.

Figure 2 is a graphical representation showing levels of ³[H] thymidine incorporation. Human peripheral blood T lymphocytes were purified into the CMRF-35⁺CD4⁺ and CMRF-35⁻CD4⁺ T lymphocyte populations and incubated with allogeneic Lin-⁺HLA⁻DR⁺ DC (A). ³[H] thymidine was added to the cultures on day 5. Cells were harvested 16 hours later. Results from one representative experiment are shown as the triplicate values \pm SEM. In (B) T lymphocyte populations were activated with PMA/ ionomycin and ³[H] thymidine was added to the cultures on day 5. Cells were harvested 16 hours later. Results from one representative experiment are shown as the triplicate values \pm SEM.

Figure 3 is a graphical representation showing dot blot analysis. Human peripheral blood T lymphocytes were purified into the CMRF-35⁺CD4⁺ and CMRF-35⁻CD4⁺ T lymphocyte populations activated with PMA/ ionomycin for four hours. GolgiPlug was added for the last 2 hours before cell populations were assayed for intracellular IFN γ staining. Results are from one of 3 representative experiments.

Figure 4 is a graphical representation showing dot blot analysis. Human peripheral blood T lymphocytes were purified into the CMRF-35⁺CD4⁺ and CMRF-35⁻CD4⁺ T lymphocyte populations activated with immobilized CD3/CD28 antibodies for four hours. GolgiPlug was added for the last 2 hours before cell populations were assayed for intracellular IFN γ staining. Results are from one of 3 representative experiments.

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Figure 5 is a graphical representation of the intensity of CD95 staining. Human peripheral blood T lymphocytes were purified into the CMRF-35⁺CD4⁺ and CMRF-35⁻CD4⁺ T lymphocyte populations activated with immobilized CD3/CD28 antibodies overnight. Cell populations were assayed for CD95 staining. Results are from one experiment.

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Figure 6 is a graphical representation of a dot blot analysis. PBMCs from a normal donor and a patient with psoriasis were analyzed using flow cytometry. CD4⁺ T cells were stained for the expression of CXCR3 and CMFR-35. Analysis revealed that patients with psoriasis had significantly reduced levels of CXCR3⁺ CMRF35⁺⁺ CD4⁺ T cells.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is predicated in part on the recognition that CMRF-35 mAb is able to subdivide peripheral CD4⁺ T-cells into three distinct populations which are CMRF-35⁻, CMRF-35⁺ and CMRF-35⁺⁺, respectively. A further subdivision of CD4⁺ T-cells based on CD45RO levels identifies five sub-populations, i.e. CMRF-35⁺⁺ CD45RO⁺, CMRF-35⁺ CD45RO⁺, CMRF-35⁻ CD45RO⁺, CMRF-35⁺ CD45RO⁻ and CMRF-35⁻ CD45RO⁻.

Accordingly, the present invention provides an isolated population of CD4⁺ T-cells wherein the population is selected from:

CMRF-35⁺⁺ CD45RO⁺;
CMRF-35⁺ CD45RO⁺;
CMRF-35⁻ CD45RO⁺;
CMRF-35⁺ CD45RO⁻; and
CMRF-35⁻ CD45RO⁻ T-cells.

Reference herein to CMRF-35⁺⁺ CD45RO⁺ population of cells also includes reference to a population of cells which is optionally CMRF-35⁺⁺ CD45RO⁺CXCR3⁺.

Each CD4⁺ sub-population is involved to varying extents in immunological responsiveness. Such immunological responsiveness includes both cell-mediated and humoral responses.

The sub-population of CD4⁺ T-cells may also be considered as a composition.

Accordingly, another aspect of the present invention is directed to a composition of CD4⁺ T-cells wherein said CD4⁺ T-cells are selected from:

CMRF-35⁺⁺ CD45RO⁺;

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CMRF-35⁺ CD45RO⁺;
CMRF-35⁻ CD45RO⁺;
CMRF-35⁺ CD45RO⁻; and
CMRF-35⁻ CD45RO⁻ T-cells.

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In a particularly preferred embodiment, the T-cell sub-population is CMRF-35⁺⁺ CD45RO⁺, which includes a sub-population of cells which are CMRF-35⁺⁺ CD45RO⁺ CXCR3⁺.

- 10 In accordance with the present invention, most CMRF-35⁺ cells are present in cord blood whereas CMRF-35⁺⁺ cells are predominantly in peripheral blood.

The terms "CMRF-35⁺" and "CMRF-35⁺⁺" may also be considered in terms of the outcome of flow cytometric analysis. Consequently, a CMRF-35⁺ cell may be regarded as CMRF-35^{Dim} and a CMRF-35⁺⁺ cell may be regarded as CMRF-35^{Bright}. As CMRF-35 mAb
15 recognizes both CMRF-35A and CMRF-35H, the designation CMRF-35⁻, CMRF-35⁺ and CMRF-35⁺⁺ is an indication of the level of presence or absence of CMRF-35A and CMRF-35H.

- 20 Consequently, the present invention provides an isolated population of CD4⁺ T-cells from peripheral or cord blood wherein said population comprises levels of CMRF-35 epitope and/or CD45RO such that binding of labeled CMRF-35 mAb or labeled CD45RO antibody is used to generate spectral data of each pixel in a sample of cells which is measurable in a spectral data collection device. Conveniently, the labels are histochemical including
25 fluorescent stains which have light absorbing or fluorescing properties resulting in populations of cell with properties ranging from CMRF-35^{Absent} through CMRF-35^{Dim} to CMRF-35^{Bright} and/or CD45RO^{Absent} through CD45RO^{Dim} to CD45RO^{Bright}.

- The term "population" includes a single cell or a group of two or more cells and, as
30 indicated above, include a composition of cells.

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Accordingly, another aspect of the present invention provides an isolated CD4⁺ T-cell selected from the list comprising a:

- 5 CMRF-35⁺⁺ CD45RO⁺;
 CMRF-35⁺ CD45RO⁺;
 CMRF-35⁻ CD45RO⁺;
 CMRF-35⁺ CD45RO⁻; and
 CMRF-35⁻ CD45RO⁻ T-cell.

- 10 The CMRF-35⁺ and CMRF-35⁺⁺ CD4⁺ T-cells show functional differences compared to CMRF-35⁻ CD4⁺ T-cells. Such differences include differences in the allogeneic MLR and *in vitro* PMA/ionomycin proliferation assays. In particular, CMRF-35⁺ and CMRF-35⁺⁺ cells result in less proliferation in both assays compared to CMRF-35⁻ cells. However, the CMRF-35⁺⁺ CD45RO⁺ sub-population is depleted in the peripheral blood during certain
- 15 conditions such as inflammatory conditions and in particular psoriasis. The consequence of such an observation is the CMRF-35⁺⁺ CD45⁺RO cells are involved in the pathogenesis of the disease either by way of promoting adverse effects of the disease (e.g. during an inflammatory response or graft *versus* host rejection) or promoting the beneficial effects of an immunological response (e.g. in response to infection).

20

- Accordingly, another aspect of the present invention contemplates a method for identifying a population of T-cells, said method comprising obtaining a sample comprising CD4⁺ T-cells and subjecting said CD4⁺ T-cells to surface marker discrimination means on the basis of levels, presence or absence of CMRF-35 epitope and CD45RO marker and
- 25 optionally CD45RO⁺.

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In a related embodiment, the presence of a particular type of condition such as an inflammatory condition or cancer can also be assessed by loss of a sub-population of T-cells from peripheral or cord blood.

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Accordingly, another aspect of the present invention contemplates a method of identifying a potential or risk of a particular condition being present or developing said method comprising collecting a sample of blood and subjecting the sample to surface marker discrimination means to identify the level, presence or absence of a CD4⁺ T-cell population
5 selected from:

CMRF-35⁺⁺ CD45RO⁺;
CMRF-35⁺ CD45RO⁺;
CMRF-35⁻ CD45RO⁺
10 CMRF-35⁺ CD45RO⁻; and
CMRF-35⁻ CD45RO⁻ T-cells;

wherein an alteration in the levels, presence or absence of one or more of the above T-cell populations is indicative of a disease condition or the propensity for a disease condition to
15 develop. As above, the CMRF-35⁺⁺ CD45RO⁺ population may also be CXCR3⁺.

Surface marker discrimination is generally achieved by using labeled antibodies to the CMRF-35 epitope or the CD45RO marker and optionally the CXCR3 marker. Preferred labels are fluorophores. Examples of fluorophores include those given in Table 2.
20

Other labels include luminescence and phosphorescence as well as infrared dyes.

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Table 2:
List of suitable fluorophores

Probe	Ex ¹ (nm)	Em ² (nm)
Reactive and conjugated probes		
Hydroxycoumarin	325	386
Aminocoumarin	350	455
Methoxycoumarin	360	410
Cascade Blue	375; 400	423
Lucifer Yellow	425	528
NBD	466	539
R-Phycoerythrin (PE)	480; 565	578
PE-Cy5 conjugates	480; 565; 650	670
PE-Cy7 conjugates	480; 565; 743	767
APC-Cy7 conjugates	650; 755	767
Red 613	480; 565	613
Fluorescein	495	519
FluorX	494	520
BODIPY-FL	503	512
TRITC	547	574
X-Rhodamine	570	576
Lissamine Rhodamine B	570	590
PerCP	490	675
Texas Red	589	615
Allophycocyanin (APC)	650	660
TruRed	490, 675	695
Alexa Fluor 350	346	445
Alexa Fluor 430	430	545
Alexa Fluor 488	494	517
Alexa Fluor 532	530	555
Alexa Fluor 546	556	573
Alexa Fluor 555	556	573
Alexa Fluor 568	578	603
Alexa Fluor 594	590	617
Alexa Fluor 633	621	639
Alexa Fluor 647	650	688
Alexa Fluor 660	663	690
Alexa Fluor 680	679	702
Alexa Fluor 700	696	719
Alexa Fluor 750	752	779
Cy2	489	506
Cy3	(512); 550	570; (615)
Cy3,5	581	596; (640)

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Probe	Ex ¹ (nm)	Em ² (nm)
Cy5	(625); 650	670
Cy5,5	675	694
Cy7	743	767
Nucleic acid probes		
Hoeschst 33342	343	483
DAPI	345	455
Hoechst 33258	345	478
SYTOX Blue	431	480
Chromomycin A3	445	575
Mithramycin	445	575
YOYO-1	491	509
SYTOX Green	504	523
SYTOX Orange	547	570
Ethidium Bromide	493	620
7-AAD	546	647
Acridine Orange	503	530/640
TOTO-1, TO-PRO-1	509	533
Thiazole Orange	510	530
Propidium Iodide (PI)	536	617
TOTO-3, TO-PRO-3	642	661
LDS 751	543; 590	712; 607
Fluorescent Proteins		
Y66F	360	508
Y66H	360	442
EBFP	380	440
Wild-type	396, 475	50, 503
GFPuv	385	508
ECFP	434	477
Y66W	436	485
S65A	471	504
S65C	479	507
S65L	484	510
S65T	488	511
EGFP	489	508
EYFP	514	527
DsRed	558	583
Other probes		
Monochlorobimane	380	461
Calcein	496	517

¹ Ex: Peak excitation wavelength (nm)

² Em: Peak emission wavelength (nm)

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Conveniently, flow cytometry is used to sort cells into particular populations. However, any suitable method of analyzing fluorescence emission is encompassed by the present invention. In this regard, the subject invention contemplates techniques including but not
5 restricted to 2-photon and 3-photon time resolved fluorescence spectroscopy as, for example, disclosed by Lakowicz *et al.*, *Biophys. J.* 72: 567, 1997, fluorescence lifetime imaging as, for example, disclosed by Eriksson *et al.*, *Biophys. J.* 2: 64, 1993 and fluorescence resonance energy transfer as, for example, disclosed by Youvan *et al.*, *Biotechnology et alia* 3: 1-18, 1997.

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Luminescence and phosphorescence may result, respectively from a suitable luminescent or phosphorescent label as is known in the art. Any optical means of identifying such label may be used in this regard.

15 Infrared radiation may result from a suitable infrared dye. Exemplary infrared dyes that may be employed in the invention include but are not limited to those disclosed in Lewis *et al.*, *Dyes Pigm.* 42(2): 197, 1999, Tawa *et al.*, *Mater. Res. Soc. Symp. Proc.* 488 [Electrical, Optical and Magnetic Properties of Organic Solid-State Materials IV], 885-890, Daneshvar *et al.*, *J. Immunol. Methods* 226(1-2): 119-128, 1999, Rapaport *et al.*,
20 *Appl. Phys. Lett.* 74(3): 329-331, 1999 and Durig *et al.*, *J. Raman Spectrosc.* 24(5): 281-285, 1993. Any suitable infrared spectroscopic method may be employed to interrogate the infrared dye. For instance, fourier transform infrared spectroscopy as, for example, described by Rahman *et al.*, *J. Org. Chem.* 63: 6196, 1998 may be used in this regard.

25 Suitably, electromagnetic scattering may result from diffraction, reflection, polarization or refraction of the incident electromagnetic radiation including light and X-rays. Such scattering can be used to quantitate the level of mRNA or level of protein.

Flow cytometry is particularly useful in analyzing fluorophore emission.

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As is known in the art, flow cytometry is a high throughput technique which involves

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rapidly analyzing the physical and chemical characteristics of particles (e.g. labeled antibodies bound to cells) as they pass through the path of one or more laser beams while suspended in a fluid stream. As each particle intercepts the laser beam, the scattered light and fluorescent light emitted by each cell or particle is detected and recorded using any suitable tracking algorithm as, for example, described hereunder.

A modern flow cytometer is able to perform these tasks up to 100,000 cells/particles s^{-1} . Through the use of an optical array of filters and dichroic mirrors, different wavelengths of fluorescent light can be separated and simultaneously detected. In addition, a number of lasers with different excitation wavelengths may be used. Hence, a variety of fluorophores can be used to target and examine, for example, different immune effectors within a sample or immune effectors from multiple subjects.

Suitable flow cytometers which may be used in the methods of the present invention include those which measure five to nine optical parameters (see Table 3) using a single excitation laser, commonly an argon ion air-cooled laser operating at 15 mW on its 488 nm spectral line. More advanced flow cytometers are capable of using multiple excitation lasers such as a HeNe laser (633 nm) or a HeCd laser (325 nm) in addition to the argon ion laser (488 or 514 nm).

Table 3:

Exemplary optical parameters which may be measured by a flow cytometer.

Parameter	Acronym	Detection angle from incident laser beam	Wavelength (nm)
Forward scattered light	FS	2-5°	488*
Side scattered light	SS	90°	488*
"Green" fluorescence	FL1	90°	510-540 [†]
"Yellow" fluorescence	FL2	90°	560-580 [†]
"Red" fluorescence	FL3	90°	>650 [#]

* using a 488 nm excitation laser

† width of bandpass filter

longpass filter

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For example, Biggs *et al.*, *Cytometry* 36: 36-45, 1999 have constructed an 11-parameter flow cytometer using three excitation lasers and have demonstrated the use of nine distinguishable fluorophores in addition to forward and side scatter measurements for purposes of immunophenotyping (i.e. classifying) particles. The maximum number of parameters commercially available currently is 17: forward scatter, side scatter and three excitation lasers each with five fluorescence detectors. Whether all of the parameters can be adequately used depends heavily on the extinction coefficients, quantum yields and amount of spectral overlap between all fluorophores (Malemed *et al.*, "*Flow cytometry and sorting*", 2nd Ed., New York, Wiley-Liss, 1990). However, it will be understood that the present invention is not restricted to any particular flow cytometer or any particular set of parameters. In this regard, the invention also contemplates use in place of a conventional flow cytometer, a microfabricated flow cytometer as, for example, disclosed by Fu *et al.*, *Nature Biotechnology* 17: 1109-1111, 1999.

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The assay of the present invention may be automated or semi-automated for high throughput screening of populations of CD4⁺ T-cells in one or a group of subjects. The automation is conveniently controlled by computer software.

20 The present invention contemplates a computer program product, therefore, for assessing the presence or absence or level of a sub-population of CD4⁺ T-cells said product comprising:-

(1) code that receives, as input values, the identity of a reporter molecule associated with a labeled antibody which recognizes one of a CMRF-35 epitope or CD45RO marker;

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(2) code that compares said input values with reference values to determine the level of CMRF-35 epitope or CD45RO; and

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(3) a computer readable medium that stores the codes.

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Still another aspect of the present invention extends to a computer for assessing the presence or absence or level of a sub-population of CD4⁺ T-cells, said computer comprises

- 5 (1) a machine-readable data storage medium comprising a data storage material encoded with machine-readable data, wherein said machine-readable data comprise input values which identify a reporter molecule associated with a labeled antibody which recognizes one of a CMRF-35 antibody or CD45RO marker;
- 10 (2) a working memory for storing instructions for processing said machine-readable data;
- (3) a central-processing unit coupled to said working memory and to said machine-readable data storage medium, for processing said machine readable data to
15 compare said values to provide an assessment of the identity or level of CMRF-35 epitope or CD45RO; and
- (4) an output hardware coupled to said central processing unit, for receiving the
20 results of the comparison.

The present invention provides, therefore, a means to distinguish between populations of CD4⁺ T-cells and to identify a particular population associated with a disease condition such as an autoimmune disease (e.g. diabetes), inflammatory condition (e.g. arthritis,
25 psoriasis), graft *versus* host disease, diabetes, cancer or a response to infection by a pathogenic agent in a subject. In addition, the immunological potential of a subject can now be readily determined in screening for the level, presence or absence of one or more of the five T-cell sub-populations. Accordingly, another aspect of the present invention provides a method for assessing the immunological potential of a subject said method
30 comprising obtaining a sample from said subject comprising T-cells and subjecting the

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sample to cell surface discrimination means to determine the presence, absence or level of CD4⁺ T-cells selected from the list consisting of:

- 5 CMRF-35⁺⁺ CD45RO⁺;
 CMRF-35⁺ CD45RO⁺;
 CMRF-35⁻ CD45RO⁺;
 CMRF-35⁺ CD45RO⁻; and
 CMRF-35⁻ CD45RO⁻ T-cells.
- 10 Examples of disease conditions contemplated by the present invention include but are not limited to Alopecia Areata, Ankylosing Spondylitis, Antiphospholipid Syndrome, Autoimmune Addison's Disease Multiple Sclerosis, Autoimmune disease of the adrenal gland, Autoimmune Hemolytic Anemia, Autoimmune Hepatitis, Autoimmune oophoritis and orchitis, Behcet's Disease, Bullous Pemphigoid, Cardiomyopathy, Celiac Sprue-
- 15 Dermatitis, Chronic Fatigue Syndrome (CFIDS), Chronic Inflam. Demyelinating, Chronic Inflam. Polyneuropathy, Churg-Strauss Syndrome, Cicatricial Pemphigoid, CREST Syndrome, Cold Agglutinin Disease, Crohn's Disease, Dermatitis herpetiformi, Discoid Lupus, Essential Mixed Cryoglobulinemi, Fibromyalgi, Glomerulonephriti, Grave's Disease, Guillain-Barre, Hashimoto's Thyroiditis, Idiopathic Pulmonary Fibrosis,
- 20 Idiopathic Thrombocytopenia Purpura (ITP), IgA Nephropathy Insulin Dependent Diabetes (Type I), Lichen Planus, Lupus, Meniere's Disease, Mixed Connective Tissue Disease, Multiple sclerosis, Myasthenia Gravis, Myocarditis, Pemphigus Vulgaris, Pernicious Anemia, Polyarteritis Nodosa, Polychondritis, Polyglancular Syndromes, Polymyalgia Rheumatica, Polymyositis and Dermatomyositis, Primary
- 25 Agammaglobulinemia, Primary Biliary Cirrhosis, Psoriasis, Raynaud's Phenomenon, Reiter's Syndrome, Rheumatic Fever, Rheumatoid Arthritis, Sarcoidosis, Scleroderma, Sjogren's Syndrome, Stiff-Man Syndrome, Systemic lupus erythematosus, Takayasu Arteritis, Temporal Arteritis/Giant Cell Arteritis, Ulcerative Colitis, Uveitis, Vasculitis, Vitiligo. Autoimmune Disease Groups Examples: Blood and blood vessels, Autoimmune
- 30 hemolytic anemia, Pernicious anemia, Polyarteritis nodosa, Systemic lupus erythematosus, Wegener's granulomatosis, Digestive tract (including the mouth), Autoimmune hepatitis,

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Behçet's disease, Crohn's disease, Primary biliary cirrhosis, Scleroderma, Ulcerative colitis, Eyes, Sjögren's syndrome, Type 1 diabetes mellitus, Uveitis, Glands, Graves' disease, Thyroiditis, Type 1 diabetes mellitus, Heart, Myocarditis, Rheumatic fever, Scleroderma, Systemic lupus erythematosus, Joints, Ankylosing spondylitis, Rheumatoid arthritis,
 5 Systemic lupus erythematosus, Kidneys, Glomerulonephritis, Systemic lupus erythematosus, Type 1 diabetes mellitus, Lungs, Rheumatoid arthritis, Sarcoidosis, Scleroderma, Systemic lupus erythematosus, Muscles, Dermatomyositis, Myasthenia gravis, Polymyositis, Nerves and brain, Guillain-Barré syndrome, Multiple sclerosis, Systemic lupus erythematosus, Skin, Alopecia areata, Pemphigus/pemphigoid, Psoriasis,
 10 Scleroderma, Systemic lupus erythematosus, Vitiligo.

Examples of inflammatory disease conditions contemplated by the present invention include but are not limited to those disease and disorders which result in a response of redness, swelling, pain, and a feeling of heat in certain areas that is meant to protect tissues
 15 affected by injury or disease. Inflammatory diseases which can be treated using the methods of the present invention, include, without being limited to, acne, angina, arthritis, aspiration pneumonia, disease, empyema, gastroenteritis, inflammation, intestinal flu, NEC, necrotizing enterocolitis, pelvic inflammatory disease, pharyngitis, PID, pleurisy, raw throat, redness, rubor, sore throat, stomach flu and urinary tract infections, Chronic
 20 Inflammatory Demyelinating Polyneuropathy, Chronic Inflammatory Demyelinating Polyradiculoneuropathy, Chronic Inflammatory Demyelinating Polyneuropathy, Chronic Inflammatory Demyelinating Polyradiculoneuropathy

Other examples of disease conditions contemplated by the present invention include but
 25 are not limited to A-Beta-Lipoproteinemia, A-V, A Beta-2-Microglobulin Amyloidosis, A-T, A1AD, A1AT, Aagenaes, Aarskog syndrome, Aarskog-Scott Syndrome, Aase-smith syndrome, Aase Syndrome, AAT, Abderhalden-Kaufmann-Lignac Syndrome, Abdominal Muscle Deficiency Syndrome, Abdominal Wall Defect, Abdominal Epilepsy, Abdominal Migraine, Abductor Spasmodic Dysphonia, Abductor Spastic Dysphonia, Abercrombie
 30 Syndrome, blepharon-Macrostomia Syndrome, ABS, Absence of HPRT, Absence of Corpus Callosum Schinzel Typ, Absence Defect of Limbs Scalp and Skull, Absence of

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Menstruation Primar, Absence of HGPRT, Absorptive Hyperoxaluria or Enteric, Abt-
 Letterer-Siwe Disease, ACADL, ACADM Deficiency, ACADM, ACADS,
 Acanthocytosis-Neurologic Disorder, Acanthocytosis, Acantholysis Bullosa, Acanthosis
 Nigricans, Acanthosis Bullosa, Acanthosis Nigricans With Insulin Resistance Type A,
 5 Acanthosis Nigricans With Insulin Resistance Type B, Acanthotic Nevus, Acatalasemia,
 Acatalasia, ACC, Accessory Atrioventricular Pathways, Accessory Atrioventricular
 Pathways, Acephaly, ACF with Cardiac Defects, Achalasia, Achard-Thiers Syndrome,
 ACHARD (Marfan variant), Achard's syndrome, Acholuric Jaundice, Achondrogenesis,
 Achondrogenesis Type IV, Achondrogenesis Type III, Achondroplasia, Achondroplasia
 10 Tarda, Achondroplastic Dwarfism, Achoo Syndrome, Achromat, Achromatope,
 Achromatopic, Achromatopsia, Achromic Nevi, Acid Ceramidase Deficiency, Acid
 Maltase Deficiency, Acid Beta-glucosidase Deficiency, Acidemia Methylmalonic,
 Acidemia Propionic, Acidemia with Episodic Ataxia and Weakness, Acidosis, Aclasis
 Tarsoepiphyseal, ACM, Acoustic Neurilemoma, Acoustic Neuroma, ACPS with Leg
 15 Hypoplasia, ACPS II, ACPS IV, ACPS III, Acquired Aphasia with Convulsive Disorder,
 Acquired Brown Syndrome, Acquired Epileptic Aphasia, Acquired Factor XIII Deficiency,
 Acquired Form of ACC (caused by infection while still in womb), Acquired
 Hyperoxaluria, Acquired Hypogammaglobulinemia, Acquired Immunodeficiency
 Syndrome (AIDS), Acquired Iron Overload, Acquired Lipodystrophy, Acquired Partial
 20 Lipodystrophy, Acquired Wandering Spleen, ACR, Acral Dysostosis with Facial and
 Genital Abnormalities, Acro Renal, Acrocallosal Syndrome Schinzel Type,
 Acrocephalosyndactyly, Acrocephalosyndactyly Type I, Acrocephalosyndactyly Type I
 Subtype I, Acrocephalopolysyndactyly Type II, Acrocephalopolysyndactyly Type III,
 Acrocephalopolysyndactyly Type IV, Acrocephalosyndactyly V (ACS5 or ACS V)
 25 Subtype I, Acrocephaly Skull Asymmetry and Mild Syndactyly, Acrocephaly,
 Acrochondrohyperplasia, Acrodermatitis Enteropathica, Acrodysostosis, Acrodystrophic
 Neuropathy, Acrofacial Dysostosis Nager Type, Acrofacial Dysostosis Postaxial Type,
 Acrofacial Dysostosis Type Genee-Wiedep, Acrogeria Familial, Acromegaly,
 Acromelalgia Hereditary, Acromesomelic Dysplasia, Acromesomelic Dwarfism,
 30 Acromicric Skeletal Dysplasia, Acromicric Dysplasia, Acroosteolysis with Osteoporosis
 and Changes in Skull and Mandible, Acroosteolysis, Acroparesthesia, ACS I, ACS Type

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II, ACS Type III, ACS, ACS3, ACTH Deficiency, Action Myoclonus, Acute Brachial Neuritis Syndrome, Acute Brachial Radiculitis Syndrome, Acute Cerebral Gaucher Disease, Acute Cholangitis, Acute Disseminated Encephalomyeloradiculopathy, Acute Disseminated Histiocytosis-X, Acute Hemorrhagic Polioencephalitis, Acute Idiopathic
 5 Polyneuritis, Acute Immune-Mediation Polyneuritis, Acute Infantile Pelizaeus-Merzbacher Brain Sclerosis, Acute Intermittant Porphyria, Acute Porphyrias, Acute Sarcoidosis, Acute Shoulder Neuritis, Acute Toxic Epidermolysis, Acyl-CoA Dehydrogenase Deficiency Long-Chain, Acyl-CoA Dehydrogenase Deficiency Short-Chain, Acyl-CoA Dihydroxyacetone Acyltransferase, Acyl-coenzyme A Oxidase Deficiency, ADA, ADA
 10 Deficiency, Adam Complex, Adamantiades-Behcet's Syndrome, Adamantinoma, Adams Oliver Syndrome, Adaptive Colitis, ADD combined type, ADD, Addison Disease with Cerebral Sclerosis, Addison's Anemia, Addison's Disease, Addison-Biermer Anemia, Addison-Schilder Disease, Addisonian Pernicious Anemia, Adducted Thumbs-Mental Retardation, Adductor Spasmodic Dysphonia, Adductor Spastic Dysphonia, Adenoma
 15 Associated Virilism of Older Women, Adenomatosis of the Colon and Rectum, Adenomatous polyposis of the Colon, Adenomatous Polyposis Familial, Adenosine Deaminase Deficiency, Adenylosuccinase deficiency, ADHD predominantly hyperactive-impulsive type, ADHD predominantly inattentive type, ADHD, Adhesive Arachnoiditis, Adie Syndrome, Adie's Syndrome, Adie's Tonic Pupil, Adie's Pupil, Adipogenital
 20 Retinitis Pigmentosa Polydactyly, Adipogenital-Retinitis Pigmentosa Syndrome, Adiposa Dolorosa, Adiposis Dolorosa, Adiposogenital Dystrophy, Adolescent Cystinosis, ADPKD, Adrenal Cortex Adenoma, Adrenal Disease, Adrenal Hyperfunction resulting from Pituitary ACTH Excess, Adrenal Hypoplasia, Adrenal Insufficiency, Adrenal Neoplasm, Adrenal Virilism, Adreno-Retinitis Pigmentosa-Polydactyly Syndrome, Adrenocortical
 25 Insufficiency, Adrenocortical Hypofunction, Adrenocorticotropic Hormone Deficiency Isolated, Adrenogenital Syndrome, Adrenoleukodystrophy, Adrenomyeloneuropathy, Adreno-Retinitis Pigmentosa-Polydactyly Syndrome, Adult Cystinosis, Adult Dermatomyositis, Adult Hypophosphatasia, Adult Macula Lutea Retinae Degeneration, Adult Onset ALD, Adult-Onset Ceroidosis, Adult Onset Medullary Cystic Disease, Adult
 30 Onset Pernicious Anemia, Adult Onset Schindler Disease, Adult-Onset Subacute Necrotizing Encephalomyelopathy, Adult Polycystic Kidney Disease, Adult Onset

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Medullary Cystic Disease, Adynlosuccinate Lyase Deficiency, AE, AEC Syndrome, AFD, Afibrinogenemia, African Siderosis, AGA, Aganglionic Megacolon, Age Related Macular Degeneration, Agenesis of Commissura Magna Cerebri, Agenesis of Corpus Callosum, Agenesis of Corpus Callosum-Infantile Spasms-Ocular Anomalies, Agenesis of Corpus Callosum and Chorioretinal Abnormality, Agenesis of Corpus Callosum-Chorioretinitis Abnormality, Aggressive mastocytosis, Agnosis Primary, AGR Triad, AGU, Agyria, Agyria-pachygria-band spectrum, AHC, AHD, AHDS, AHF Deficiency, AHG Deficiency, AHO, Ahumada Del Castillo, Aicardi Syndrome, AIED, AIMP, AIP, AIS, Akinetic Seizure, ALA-D Porphyria, Alactasia, Alagille Syndrome, Aland Island Eye Disease (X-Linked), Alaninuria, Albers-Schonberg Disease, Albinism, Albinismus, Albinoidism, Albright Hereditary Osteodystrophy, Alcaptonuria, Alcohol-Related Birth Defects, Alcoholic Embryopathy, Ald, ALD, ALD, Aldosterone, Aldosteronism With Normal Blood Pressure, Aldrich Syndrome, Alexander's Disease, Alexanders Disease, Algodystrophy, Algoneurodystrophy, Alkaptonuria, Alkaptonuric Ochronosis, Alkyl DHAP synthase deficiency, Allan-Herndon-Dudley Syndrome, Allan-Herndon Syndrome, Allan-Herndon-Dudley Mental Retardation, Allergic Granulomatous Antitis, Allergic Granulomatous Angiitis of Cronkhite-Canada, Alobar Holoprosencephaly, Alopecia Areata, Alopecia Celsi, Alopecia Cicatrisata, Alopecia Circumscripta, Alopecia-Poliosis-Uveitis-Vitiligo-Deafness-Cutaneous-Uveo-O, Alopecia Seminuniversalis, Alopecia Totalis, Alopecia Universalis, Alpers Disease, Alpers Diffuse Degeneration of Cerebral Gray Matter with Hepatic Cirrhosis, Alpers Progressive Infantile Poliodystrophy, Alpha-1-Antitrypsin Deficiency, Alpha-1 4 Glucosidase Deficiency, Alpha-Galactosidase A Deficiency, Alpha-Galactosidase B Deficiency, Alpha High-Density Lipoprotein Deficiency, Alpha-L-Fucosidase Deficiency Fucosidosis Type 3, Alpha-GalNAc Deficiency Schindler Type, Alphalipoproteinemia, Alpha Mannosidosis, Alpha-N-Acetylgalactosaminidase Deficiency Schindler Type, Alpha-NAGA Deficiency Schindler Type, Alpha-Neuraminidase Deficiency, Alpha-Thalassemia/mental retardation syndrome non-deletion type, Alphalipoproteinemia, Alport Syndrome, ALS, Alstroem's Syndrome, Alstroem, Alstrom Syndrome, Alternating Hemiplegia Syndrome, Alternating Hemiplegia of Childhood, Alzheimer's Disease, Amaurotic Familial Idiocy, Amaurotic Familial Idiocy Adult, Amaurotic Familial Infantile Idiocy, Ambiguous Genitalia, AMC, AMD,

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Ameloblastoma, Amelogenesis Imperfecta, Amenorrhea-Galactorrhea Nonpuerperal, Amenorrhea-Galactorrhea-FSH Decrease Syndrome, Amenorrhea, Amino Acid Disorders, Aminoaciduria-Osteomalacia-Hyperphosphaturia Syndrome, AMN, Amniocentesis, Amniotic Bands, Amniotic Band Syndrome, Amniotic Band Disruption Complex, 5 Amniotic Band Sequence, Amniotic Rupture Sequence, Amputation Congenital, AMS, Amsterdam Dwarf Syndrome de Lange, Amylo-1 6-Glucosidase Deficiency, Amyloid Arthropathy of Chronic Hemodialysis, Amyloid Corneal Dystrophy, Amyloid Polyneuropathy, Amyloidosis, Amyloidosis of Familial Mediterranean Fever, Amylopectinosis, Amyoplasia Congenita, Amyotrophic Lateral Sclerosis, Amyotrophic 10 Lateral Sclerosis, Amyotrophic Lateral Sclerosis-Polyglucosan Bodies, AN, AN 1, AN 2, Anal Atresia, Anal Membrane, Anal Rectal Malformations, Anal Stenosis, Analine 60 Amyloidosis, Analphalipoproteinemia, Analrectal, Analrectal, Anaplastic Astrocytoma, Andersen Disease, Anderson-Fabry Disease, Andersen Glycogenosis, Anderson-Warburg Syndrome, Andre Syndrome, Andre Syndrome Type II, Androgen Insensitivity, Androgen 15 Insensitivity Syndrome Partial, Androgen Insensitivity Syndrome Partial, Androgenic Steroids, Anemia Autoimmune Hemolytic, Anemia Blackfan Diamond, Anemia, Congenital, Triphalangeal Thumb Syndrome, Anemia Hemolytic Cold Antibody, Anemia Hemolytic with PGK Deficiency, Anemia Pernicious, Anencephaly, Angelman Syndrome, Angio-Osteohypertrophy Syndrome, Angiofollicular Lymph Node Hyperplasia, 20 Angiohemophilia, Angiokeratoma Corporis, Angiokeratoma Corporis Diffusum, Angiokeratoma Diffuse, Angiomatosis Retina, Angiomatous Lymphoid, Angioneurotic Edema Hereditary, Anhidrotic Ectodermal Dysplasia, Anhidrotic X-Linked Ectodermal Dysplasias, Aniridia, Aniridia-Ambiguous Genitalia-Mental Retardation, Aniridia Associated with Mental Retardation, Aniridia-Cerebellar Ataxia-Mental Deficiency, 25 Aniridia Partial-Cerebellar Ataxia-Mental Retardation, Aniridia Partial-Cerebellar Ataxia-Oligophrenia, Aniridia Type I, Aniridia Type II, Aniridia-Wilms' Tumor Association, Aniridia-Wilms' Tumor-Gonadoblastoma, Ankyloblepharon-Ectodermal Defects-Cleft Lip/Palate, Ankylosing Spondylitis, Annular groves, Anodontia, Anodontia Vera, Anomalous Trichromasy, Anomalous Dysplasia of Dentin, Coronal Dentin Dysplasia, 30 Anomic Aphasia, Anophthalmia, Anorectal, Anorectal Malformations, Anosmia, Anterior Bowing of the Legs with Dwarfism, Anterior Membrane Corneal Dystrophy, Anti-

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Convulsant Syndrome, Anti-Epstein-Barr Virus Nuclear Antigen (EBNA) Antibody Deficiency, Antibody Deficiency, Antibody Deficiency with near normal Immunoglobulins, Antihemophilic Factor Deficiency, Antihemophilic Globulin Deficiency, Antiphospholipid Syndrome, Antiphospholipid Antibody Syndrome, 5 Antithrombin III Deficiency, Antithrombin III Deficiency Classical (Type I), Antitrypsin Deficiency, Antley-Bixler Syndrome, Antoni's Palsy, Anxiety Tibialis, Aorta Arch Syndrome, Aortic and Mitral Atresia with Hypoplastic Left Heart Syndrome, Aortic Stenosis, Apatosis, APC, APECED Syndrome, Apert Syndrome, Apert's, Aphasia, Aplasia Axialis Extracorticales Congenital, Aplasia Cutis Congenita, Aplasia Cutis 10 Congenita with Terminal Transverse Limb Defects, Aplastic Anemia, Aplastic Anemia with Congenital Anomalies, APLS, Apnea, Appalachian Type Amyloidosis, Apple Peel Syndrome, Apraxia, Apraxia Buccofacial, Apraxia Constructional, Apraxia Ideational, Apraxia Ideokinetic, Apraxia Ideomotor, Apraxia Motor, Apraxia Oculomotor, APS, Arachnitis, Arachnodactyly Contractural Beals Type, Arachnodactyly, Arachnoid Cysts, 15 Arachnoiditis Ossificans, Arachnoiditis, Aran-Duchenne, Aran-Duchenne Muscular Atrophy, Aregenerative Anemia, Arginase Deficiency, Argininemia, Arginino Succinase Deficiency, Argininosuccinase Deficiency, Argininosuccinate Lyase Deficiency, Argininosuccinic Acid Lyase-ASL, Argininosuccinic Acid Synthetase Deficiency, Argininosuccinic Aciduria, Argonz-Del Castillo Syndrome, Arhinencephaly, Armenian 20 Syndrome, Arnold-Chiari Malformation, Arnold-Chiari Syndrome, ARPKD, Arrhythmic Myoclonus, Arrhythmogenic Right Ventricular Dysplasia, Arteriohepatic Dysplasia, Arteriovenous Malformation, Arteriovenous Malformation of the Brain, Arteritis Giant Cell, Arthritis, Arthritis Urethritica, Arthro-Dento-Osteodysplasia, Arthro-Ophthalmopathy, Arthrochhalasis Multiplex Congenita, Arthrogryposis Multiplex 25 Congenita, Arthrogryposis Multiplex Congenita, Distal, Type IIA, ARVD, Arylsulfatase-B Deficiency, AS, ASA Deficiency, Ascending Paralysis, ASD, Atrioseptal Defects, ASH, Ashermans Syndrome, Ashkenazi Type Amyloidosis, ASL Deficiency, Aspartylglucosaminuria, Aspartylglycosaminuria, Asperger's Syndrome, Asperger's Type Autism, Asphyxiating Thoracic Dysplasia, Asplenia Syndrome, ASS Deficiency, Asthma, 30 Astrocytoma Grade I (Benign), Astrocytoma Grade II (Benign), Asymmetric Crying Facies with Cardiac Defects, Asymmetrical septal hypertrophy, Asymptomatic Callosal

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Agensis, AT, AT III Deficiency, AT III Variant IA, AT III Variant Ib, AT 3, Ataxia, Ataxia Telangiectasia, Ataxia with Lactic Acidosis Type II, Ataxia Cerebral Palsy, Ataxiodynamia, Ataxiophemia, ATD, Athetoid Cerebral Palsy, Atopic Eczema, Atresia of Esophagus with or without Tracheoesophageal Fistula, Atrial Septal Defects, Atrial Septal Defect Primum, Atrial and Septal and Small Ventricular Septal Defect, Atrial Flutter, Atrial Fibrillation, Atriadigital Dysplasia, Atrioseptal Defects, Atrioventricular Block, Atrioventricular Canal Defect, Atrioventricular Septal Defect, Atrophia Bulborum Hereditaria, Atrophic Beriberi, Atrophy Olivopontocerebellar, Attention Deficit Disorder, Attention Deficit Hyperactivity Disorder, Attenuated Adenomatous Polyposis Coli, Atypical Amyloidosis, Atypical Hyperphenylalaninemia, Auditory Canal Atresia, Auriculotemporal Syndrome, Autism, Autism Asperger's Type, Autism Dementia Ataxia and Loss of Purposeful Hand Use, Autism Infantile Autism, Autoimmune Addison's Disease, Autoimmune Hemolytic Anemia, Autoimmune Hepatitis, Autoimmune-Polyendocrinopathy-Candidias, Autoimmune Polyglandular Disease Type I, Autosomal Dominant Albinism, Autosomal Dominant Compelling Helioophthalmic Outburst Syndrome, Autosomal Dominant Desmin Distal myopathy with Late Onset, Autosomal Dominant EDS, Autosomal Dominant Emery-Dreifuss Muscular Dystrophy, Autosomal Dominant Keratoconus, Autosomal Dominant Pelizaeus-Merzbacher Brain Sclerosis, Autosomal Dominant Polycystic Kidney Disease, Autosomal Dominant Spinocerebellar Degeneration, Autosomal Recessive Agammaglobulinemia, Autosomal Recessive Centronuclear myopathy, Autosomal Recessive Conradi-Hunermann Syndrome, Autosomal Recessive EDS, Autosomal Recessive Emery-Dreifuss Muscular Dystrophy, Autosomal Recessive Forms of Ocular Albinism, Autosomal Recessive Inheritance Agensis of Corpus Callosum, Autosomal Recessive Keratoconus, Autosomal Recessive Polycystic Kidney Disease, Autosomal Recessive Severe Combined Immunodeficiency, AV, AVM, AVSD, AWTa, Axilla Abscess, Axonal Neuropathy Giant, Azorean Neurologic Disease, B-K Mole Syndrome, Babinski-Froelich Syndrome, BADS, Baillarger's Syndrome, Balkan Disease, Baller-Gerold Syndrome, Ballooning Mitral Valve, Balo Disease Concentric Sclerosis, Baltic Myoclonus Epilepsy, Bannayan-Zonana syndrome (BZS), Bannayan-Riley-Ruvalcaba syndrome, Banti's Disease, Bardet-Biedl Syndrome, Bare Lymphocyte Syndrome, Barlow's syndrome, Barraquer-Simons Disease,

Barrett Esophagus, Barrett Ulcer, Barth Syndrome, Bartter's Syndrome, Basal Cell Nevus Syndrome, Basedow Disease, Bassen-Kornzweig Syndrome, Batten Disease, Batten-Mayou Syndrome, Batten-Spielmeyer-Vogt's Disease, Batten Turner Syndrome, Batten Turner Type Congenital myopathy, Batten-Vogt Syndrome, BBB Syndrome, BBB Syndrome (Opitz), BBB Syndrome, BBBG Syndrome, BCKD Deficiency, BD, BDLS, BE, 5 Beals Syndrome, Beals Syndrome, Beals-Hecht Syndrome, Bean Syndrome, BEB, Bechterew Syndrome, Becker Disease, Becker Muscular Dystrophy, Becker Nevus, Beckwith Wiedemann Syndrome, Beckwith-Syndrome, Begnez-Cesar's Syndrome, Behcet's syndrome, Behcet's Disease, Behr 1, Behr 2, Bell's Palsy, Benign Acanthosis 10 Nigricans, Benign Astrocytoma, Benign Cranial Nerve Tumors, Benign Cystinosis, Benign Essential Blepharospasm, Benign Essential Tremor, Benign Familial Hematuria, Benign Focal Amyotrophy, Benign Focal Amyotrophy of ALS, Benign Hydrocephalus, Benign Hypermobility Syndrome, Benign Keratosis Nigricans, Benign Paroxysmal Peritonitis, Benign Recurrent Hematuria, Benign Recurrent Intrahepatic Cholestasis, Benign Spinal 15 Muscular Atrophy with Hypertrophy of the Calves, Benign Symmetrical Lipomatosis, Benign Tumors of the Central Nervous System, Berardinelli-Seip Syndrome, Berger's Disease, Beriberi, Berman Syndrome, Bernard-Horner Syndrome, Bernard-Soulier Syndrome, Besnier Prurigo, Best Disease, Beta-Alanine-Pyruvate Aminotransferase, Beta-Galactosidase Deficiency Morquio Syndrome, Beta-Glucuronidase Deficiency, Beta 20 Oxidation Defects, Beta Thalassemia Major, Beta Thalassemia Minor, Betalipoprotein Deficiency, Bethlem myopathy, Beuren Syndrome, BH4 Deficiency, Biber-Haab-Dimmer Corneal Dystrophy, Bicuspid Aortic Valve, Biedl-Bardet, Bifid Cranium, Bifunctional Enzyme Deficiency, Bilateral Acoustic Neurofibromatosis, Bilateral Acoustic Neuroma, Bilateral Right-Sidedness Sequence, Bilateral Renal Agenesis, Bilateral Temporal Lobe 25 Disorder, Biliary Attacks, Bilirubin Glucuronosyltransferase Deficiency Type I, Binder Syndrome, Binswanger's Disease, Binswanger's Encephalopathy, Biotinidase deficiency, Bird-Headed Dwarfism Seckel Type, Birth Defects, Birthmark, Bitemporal Forceps Marks Syndrome, Biventricular Fibrosis, Bjornstad Syndrome, B-K Mole Syndrome, Black Locks-Albinism-Deafness of Sensoneural Type (BADs), Blackfan-Diamond Anemia, 30 Blennorrhoeal Idiopathic Arthritis, Blepharophimosis, Ptosis, Epicanthus Inversus Syndrome, Blepharospasm, Blepharospasm Benign Essential, Blepharospasm

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Oromandibular Dystonia, Blessig Cysts, BLFS, Blindness, Bloch-Siemens Incontinentia Pigmenti Melanoblastosis Cutis Linearis, Bloch-Siemens-Sulzberger Syndrome, Bloch-Sulzberger Syndrome, Blood types, Blood type A, Blood type B, Blood type AB, Blood type O, Bloom Syndrome, Bloom-Torre-Mackacek Syndrome, Blue Rubber Bleb Nevus, 5 Blue Baby, Blue Diaper Syndrome, BMD, BOD, BOFS, Bone Tumor-Epidermoid Cyst-Polypsis, Bonnet-Dechaume-Blanc Syndrome, Bonnevie-Ulrich Syndrome, Book Syndrome, BOR Syndrome, BORJ, Borjeson Syndrome, Borjeson-Forssman-Lehmann Syndrome, Bowen Syndrome, Bowen-Conradi Syndrome, Bowen-Conradi Hutterite, Bowen-Conradi Type Hutterite Syndrome, Bowman's Layer, BPEI, BPES, Brachial 10 Neuritis, Brachial Neuritis Syndrome, Brachial Plexus Neuritis, Brachial-Plexus-Neuropathy, Brachiocephalic Ischemia, Brachmann-de Lange Syndrome, Brachycephaly, Brachymorphic Type Congenital, Bradycardia, Brain Tumors, Brain Tumors Benign, Brain Tumors Malignant, Branched Chain Alpha-Ketoacid Dehydrogenase Deficiency, Branched Chain Ketonuria I, Brancher Deficiency, Branchio-Oculo-Facial Syndrome, Branchio-Oto- 15 Renal Dysplasia, Branchio-Oto-Renal Syndrome, Branchiooculofacial Syndrome, Branchiootic Syndrome, Brandt Syndrome, Brandywine Type Dentinogenesis Imperfecta, Brandywine type Dentinogenesis Imperfecta, Breast Cancer, BRIC Syndrome, Brittle Bone Disease, Broad Beta Disease, Broad Thumb Syndrome, Broad Thumbs and Great Toes Characteristic Facies and Mental Retardation, Broad Thumb-Hallux, Broca's 20 Aphasia, Brocq-Duhring Disease, Bronze Diabetes, Bronze Schilder's Disease, Brown Albinism, Brown Enamel Hereditary, Brown-Sequard Syndrome, Brown Syndrome, BRRS, Brueghel Syndrome, Bruton's Agammaglobulinemia Common, BS, BSS, Buchanan's Syndrome, Budd's Syndrome, Budd-Chiari Syndrome, Buerger-Gruetz Syndrome, Bulbospinal Muscular Atrophy-X-linked, Bulldog Syndrome, Bullosa 25 Hereditaria, Bullous CIE, Bullous Congenital Ichthyosiform Erythroderma, Bullous Ichthyosis, Bullous Pemphigoid, Burkitt's Lymphoma, Burkitt's Lymphoma African type, Burkitt's Lymphoma Non-african type, BWS, Byler's Disease, C Syndrome, C1 Esterase Inhibitor Dysfunction Type II Angioedema, C1-INH, C1 Esterase Inhibitor Deficiency Type I Angioedema, C1NH, Cacchi-Ricci Disease, CAD, CADASIL, CAH, Calcaneal 30 Valgus, Calcaneovalgus, Calcium Pyrophosphate Dihydrate Deposits, Callosal Agensis and Ocular Abnormalities, Calves-Hypertrophy of Spinal Muscular Atrophy, Campomelic

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Dysplasia, Campomelic Dwarfism, Campomelic Syndrome, Camptodactyly-Cleft Palate-Clubfoot, Camptodactyly-Limited Jaw Excursion, Camptomelic Dwarfism, Camptomelic Syndrome, Camptomelic Syndrome Long-Limb Type, Camurati-Engelmann Disease, Canada-Cronkhite Disease, Canavan disease, Canavan's Disease Included, Canavan's
 5 Leukodystrophy, Cancer, Cancer Family Syndrome Lynch Type, Cantrell Syndrome, Cantrell-Haller-Ravich Syndrome, Cantrell Pentalogy, Carbamyl Phosphate Synthetase Deficiency, Carbohydrate Deficient Glycoprotein Syndrome, Carbohydrate-Deficient Glycoprotein Syndrome Type Ia, Carbohydrate-Induced Hyperlipemia, Carbohydrate Intolerance of Glucose Galactose, Carbon Dioxide Acidosis, Carboxylase Deficiency
 10 Multiple, Cardiac-Limb Syndrome, Cardio-auditory Syndrome, Cardioauditory Syndrome of Jervell and Lange-Nielsen, Cardiocutaneous Syndrome, Cardio-facial-cutaneous syndrome, Cardiofacial Syndrome Cayler Type, Cardiomegalia Glycogenica Diffusa, Cardiomyopathic Lentiginosis, Cardio myopathy, Cardio myopathy Associated with Desmin Storage myopathy, Cardio myopathy Due to Desmin Defect, Cardio myopathy-
 15 Neutropenia Syndrome, Cardio myopathy-Neutropenia Syndrome Lethal Infantile Cardio myopathy, Cardiopathic Amyloidosis, Cardiospasm, Cardocardiac Syndrome, Carnitine-Acylcarnitine Translocase Deficiency, Carnitine Deficiency and Disorders, Carnitine Deficiency Primary, Carnitine Deficiency Secondary, Carnitine Deficiency Secondary to MCAD Deficiency, Carnitine Deficiency Syndrome, Carnitine Palmitoyl Transferase I &
 20 II (CPT I & II), Carnitine Palmitoyltransferase Deficiency, Carnitine Palmitoyltransferase Deficiency Type 1, Carnitine Palmitoyltransferase Deficiency Type 2 benign classical muscular form included severe infantile form included, Carnitine Transport Defect (Primary Carnitine Deficiency), Carnosinase Deficiency, Carnosinemia, Caroli Disease, Carpenter syndrome, Carpenter's, Cartilage-Hair Hypoplasia, Castleman's Disease,
 25 Castleman's Disease Hyaline Vascular Type, Castleman's Disease Plasma Cell Type, Castleman Tumor, Cat Eye Syndrome, Cat's Cry Syndrome, Catalayse deficiency, Cataract-Dental Syndrome, Cataract X-Linked with Hutchinsonian Teeth, Catecholamine hormones, Catel-Manzke Syndrome, Catel-Manzke Type Palatodigital Syndrome, Caudal Dysplasia, Caudal Dysplasia Sequence, Caudal Regression Syndrome, Causalgia
 30 Syndrome Major, Cavernomas, Cavernous Angioma, Cavernous Hemangioma, Cavernous Lymphangioma, Cavernous Malformations, Cayler Syndrome, Cazenave's Vitiligo,

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CBGD, CBPS, CCA, CCD, CCHS, CCM Syndrome, CCMS, CCO, CD, CDG1a, CDG1A, CDGS Type Ia, CDGS, CDI, CdLS, Celiac Disease, Celiac sprue, Celiac Sprue-Dermatitis, Cellular Immunodeficiency with Purine Nucleoside Phosphorylase Deficiency, Celsus' Vitiligo, Central Apnea, Central Core Disease, Central Diabetes Insipidus, Central
 5 Form Neurofibromatosis, Central Hypoventilation, Central Sleep Apnea, Centrifugal Lipodystrophy, Centronuclear myopathy, CEP, Cephalocele, Cephalothoracic Lipodystrophy, Ceramide Trihexosidase Deficiency, Cerebellar Agenesis, Cerebellar Aplasia, Cerebellar Hemiagenesis, Cerebellar Hypoplasia, Cerebellar Vermis Aplasia, Cerebellar Vermis Agenesis-Hypernea-Episodic Eye Moves-Ataxia-Retardation,
 10 Cerebellar Syndrome, Cerebellarparenchymal Disorder IV, Cerebellomedullary Malformation Syndrome, Cerebello-Oculocutaneous Telangiectasia, Cerebelloparenchymal Disorder IV Familial, Cerebellopontine Angle Tumor, Cerebral Arachnoiditis, Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukodystrophy, Cerebral Beriberi, Cerebral Diplegia, Cerebral Gigantism, Cerebral
 15 Malformations Vascular, Cerebral Palsy, Cerebro-Oculorenal Dystrophy, Cerebro-Oculo-Facio-Skeletal Syndrome, Cerebrocostomandibular syndrome, Cerebrohepatorenal Syndrome, Cerebromacular Degeneration, Cerebromuscular Dystrophy Fukuyama Type, Cerebroocular Dysgenesis, Cerebroocular Dysplasia-Muscular Dystrophy Syndrome, Cerebrooculofacioskeletal Syndrome, Cerebroretinal Arteriovenous Aneurysm,
 20 Cerebroside Lipidosis, Cerebrosidosis, Cerebrotendinous Xanthomatosis, Cerebrovascular Ferrocalcinosis, Ceroid-Lipofuscinosis Adult form, Cervical Dystonia, Cervical Dystonia, Cervico-Oculo-Acoustic Syndrome, Cervical Spinal Stenosis, Cervical Vertebral Fusion, CES, CF, CFC syndrome, CFIDS, CFND, CGD, CGF, Chalasoderma Generalized, Chanarin Dorfman Disease, Chanarin Dorfman Syndrome, Chanarin Dorfman Ichthyosis
 25 Syndrome, Chandler's Syndrome, Charcot's Disease, Charcot-Marie-Tooth, Charcot-Marie-Tooth Disease, Charcot-Marie-Tooth Disease Variant, Charcot-Marie-Tooth-Roussy-Levy Disease, CHARGE Association, Charge Syndrome, CHARGE Syndrome, Chaund's Ectodermal Dysplasias, Chediak-Higashi Syndrome, Chediak-Steinbrinck-Higashi Syndrome, Cheilitis Granulomatosa, Cheiloschisis, Chemke Syndrome, Cheney
 30 Syndrome, Cherry Red Spot and Myoclonus Syndrome, CHF, CHH, Chiari's Disease, Chiari Malformation I, Chiari Malformation, Chiari Type I (Chiari Malformation I), Chiari

Type II (Chiari Malformation II), Chiari I Syndrome, Chiari-Budd Syndrome, Chiari-Frommel Syndrome, Chiari Malformation II, CHILD Syndrome, CHILD Ichthyosis Syndrome, CHILD Syndrome Ichthyosis, Childhood Adrenoleukodystrophy, Childhood Dermatomyositis, Childhood-onset Dystonia, Childhood Cyclic Vomiting, Childhood

5 Giant Axonal Neuropathy, Childhood Hypophosphatasia, Childhood Muscular Dystrophy, CHN, Cholestasis, Cholestasis Hereditary Norwegian Type, Cholestasis Intrahepatic, Cholestasis Neonatal, Cholestasis of Oral Contraceptive Users, Cholestasis with Peripheral Pulmonary Stenosis, Cholestasis of Pregnancy, Cholesterol Desmolase Deficiency, Chondrodysplasia Punctata, Chondrodystrophia Calcificans Congenita, Chondrodystrophia

10 Fetalis, Chondrodystrophic Myotonia, Chondrodystrophy, Chondrodystrophy with Clubfeet, Chondrodystrophy Epiphyseal, Chondrodystrophy Hyperplastic Form, Chondroectodermal Dysplasias, Chondrogenesis Imperfecta, Chondrohystrophia, Chondroosteodystrophy, Choreoacanthocytosis, Chorionic Villi Sampling, Choriorretinal Anomalies, Choriorretinal Anomalies with ACC, Choriorrenal Coloboma-Joubert

15 Syndrome, Choroidal Sclerosis, Choroideremia, Chotzen Syndrome, Christ-Siemens-Touraine Syndrome, Christ-Siemans-Touraine Syndrome, Christmas Disease, Christmas Tree Syndrome, Chromosome 3 Deletion of Distal 3p, Chromosome 3 Distal 3p Monosomy, Chromosome 3-Distal 3q2 Duplication, Chromosome 3-Distal 3q2 Trisomy, Chromosome 3 Monosomy 3p2, Chromosome 3q Partial Duplication Syndrome,

20 Chromosome 3q, Partial Trisomy Syndrome, Chromosome 3-Trisomy 3q2, Chromosome 4 Deletion 4q31-qter Syndrome, Chromosome 4 Deletion 4q32-qter Syndrome, Chromosome 4 Deletion 4q33-qter Syndrome, Chromosome 4 Long Arm Deletion, Chromosome 4 Long Arm Deletion, Chromosome 4 Monosomy 4q, Chromosome 4-Monosomy 4q, Chromosome 4 Monosomy Distal 4q, Chromosome 4 Partial Deletion 4p,

25 Chromosome 4, Partial Deletion of the Short Arm, Chromosome 4 Partial Monosomy of Distal 4q, Chromosome 4 Partial Monosomy 4p, Chromosome 4 Partial Trisomy 4 (q25-qter), Chromosome 4 Partial Trisomy 4 (q26 or q27-qter), Chromosome 4 Partial Trisomy 4 (q31 or 32-qter), Chromosome 4 Partial Trisomy 4p, Chromosome 4 Partial Trisomies 4q2 and 4q3, Chromosome 4 Partial Trisomy Distal 4, Chromosome 4 Ring, Chromosome

30 4 4q Terminal Deletion Syndrome, Chromosome 4q- Syndrome, Chromosome 4q-Syndrome, Chromosome 4 Trisomy 4, Chromosome 4 Trisomy 4p, Chromosome 4 XY/47

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XXY (Mosaic), Chromosome 5 Monosomy 5p, Chromosome 5, Partial Deletion of the
 Short Arm Syndrome, Chromosome 5 Trisomy 5p, Chromosome 5 Trisomy 5p Complete
 (5p11-pter), Chromosome 5 Trisomy 5p Partial (5p13 or 14-pter), Chromosome 5p-
 Syndrome, Chromosome 6 Partial Trisomy 6q, Chromosome 6 Ring, Chromosome 6
 5 Trisomy 6q2, Chromosome 7 Monosomy 7p2, Chromosome 7 Partial Deletion of Short
 Arm (7p2-), Chromosome 7 Terminal 7p Deletion [del (7) (p21-p22)], Chromosome 8
 Monosomy 8p2, Chromosome 8 Monosomy 8p21-pter, Chromosome 8 Partial Deletion
 (short arm), Chromosome 8 Partial Monosomy 8p2, Chromosome 9 Complete Trisomy 9P,
 Chromosome 9 Partial Deletion of Short Arm, Chromosome 9 Partial Monosomy 9p,
 10 Chromosome 9 Partial Monosomy 9p22, Chromosome 9 Partial Monosomy 9p22-pter,
 Chromosome 9 Partial Trisomy 9P Included, Chromosome 9 Ring, Chromosome 9
 Tetrasomy 9p, Chromosome 9 Tetrasomy 9p Mosaicism, Chromosome 9 Trisomy 9p
 (Multiple Variants), Chromosome 9 Trisomy 9 (pter-p21 to q32) Included, Chromosome 9
 Trisomy Mosaic, Chromosome 9 Trisomy Mosaic, Chromosome 10 Distal Trisomy 10q,
 15 Chromosome 10 Monosomy, Chromosome 10 Monosomy 10p, Chromosome 10, Partial
 Deletion (short arm), Chromosome 10, 10p- Partial, Chromosome 10 Partial Trisomy
 10q24-qter, Chromosome 10 Trisomy 10q2, Partial Monosomy of Long Arm of
 Chromosome 11, Chromosome 11 Partial Monosomy 11q, Chromosome 11 Partial
 Trisomy, Chromosome 11 Partial Trisomy 11q13-qter, Chromosome 11 Partial Trisomy
 20 11q21-qter, Chromosome 11 Partial Trisomy 11q23-qter, Chromosome 11q, Partial
 Trisomy, Chromosome 12 Isochromosome 12p Mosaic, Chromosome 13 Partial
 Monosomy 13q, Chromosome 13, Partial Monosomy of the Long Arm, Chromosome 14
 Ring, Chromosome 14 Trisomy, Chromosome 15 Distal Trisomy 15q, Chromosome 15,
 Chromosome 15 Ring, Chromosome 15 Trisomy 15q2, Chromosome 15q, Partial
 25 Duplication Syndrome, Chromosome 17 Interstitial Deletion 17p, Chromosome 18 Long
 Arm Deletion Syndrome, Chromosome 18 Monosomy 18p, Chromosome 18 Monosomy
 18Q, Chromosome 18 Ring, Chromosome 18 Tetrasomy 18p, Chromosome 18q-
 Syndrome, Chromosome 21 Mosaic 21 Syndrome, Chromosome 21 Ring, Chromosome 21
 Translocation 21 Syndrome, Chromosome 22 Inverted Duplication (22pter-22q11),
 30 Chromosome 22 Partial Trisomy (22pter-22q11), Chromosome 22 Ring, Chromosome 22
 Trisomy Mosaic, Chromosome 48 XXYY, Chromosome 48 XXXY, Chromosome 15,

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Chromosomal Triplication, Chromosome Triplication, Chromosome Triploidy Syndrome, Chromosome X, Chromosome XXY, Chronic Acholuric Jaundice, Chronic Adhesive Arachnoiditis, Chronic Adrenocortical Insufficiency, Chronic Caverositis, Chronic Congenital Aregenerative Anemia, Chronic Dysphagocytosis, Chronic Familial
5 Granulomatosis, Chronic Familial Icterus, Chronic Fatigue Immune Dysfunction Syndrome (CFIDS), Chronic Granulomatous Disease, Chronic Guillain-Barre Syndrome, Chronic Idiopathic Jaundice, Chronic Idiopathic Polyneuritis (CIP), Chronic Inflammatory Demyelinating Polyneuropathy, Chronic Inflammatory Demyelinating Polyradiculoneuropathy, Chronic Motor Tic, Chronic Mucocutaneous Candidiasis,
10 Chronic Multiple Tics, Chronic Non-Specific Ulcerative Colitis, Chronic Obliterative Cholangitis, Chronic Peptic Ulcer and Esophagitis Syndrome, Chronic Progressive Chorea, Chronic Progressive External Ophthalmoplegia Syndrome, Chronic Progressive External Ophthalmoplegia and myopathy, Chronic Progressive External Ophthalmoplegia with Ragged Red Fibers, Chronic Relapsing Polyneuropathy, Chronic Sarcoidosis, Chronic
15 Spasmodic Dysphonia, Chronic Vomiting in Childhood, CHS, Churg-Strauss Syndrome, Cicatricial Pemphigoid, CIP, Cirrhosis Congenital Pigmentary, Cirrhosis, Cistinuria, Citrullinemia, CJD, Classic Schindler Disease, Classic Type Pfeiffer Syndrome, Classical Maple Syrup Urine Disease, Classical Hemophilia, Classical Form Cockayne Syndrome Type I (Type A), Classical Leigh's Disease, Classical Phenylketonuria, Classical X-Linked
20 Pelizaeus-Merzbacher Brain Sclerosis, CLE, Cleft Lip/Palate Mucous Cysts Lower Lip PP Digital and Genital Anomalies, Cleft Lip-Palate Blepharophimosis Lagophthalmos and Hypertelorism, Cleft Lip/Palate with Abnormal Thumbs and Microcephaly, Cleft palate-joint contractures-dandy walker malformations, Cleft Palate and Cleft Lip, Cleidocranial Dysplasia w/ Micrognathia, Absent Thumbs, & Distal Aphyalangia, Cleidocranial
25 Dysostosis, Cleidocranial Dysplasia, Click murmur syndrome, CLN1, Clonic Spasmodic, Clouston Syndrome, Clubfoot, CMDI, CMM, CMT, CMTC, CMTX, COA Syndrome, Coarctation of the aorta, Coats' Disease, Cobblestone dysplasia, Cochin Jewish Disorder, Cockayne Syndrome, COD-MD Syndrome, COD, Coffin Lowry Syndrome, Coffin Syndrome, Coffin Siris Syndrome, COFS Syndrome, Cogan Corneal Dystrophy, Cogan
30 Reese Syndrome, Cohen Syndrome, Cold Agglutinin Disease, Cold Antibody Disease, Cold Antibody Hemolytic Anemia, Colitis Ulcerative, Colitis Gravis, Colitis Ulcerative

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Chronic Non-Specific Ulcerative Colitis, Collodion Baby, Coloboma Heart Defects Atresia of the Choanae Retardation of Growth and Development Genital and Urinary Anomalies and Ear Anomalies, Coloboma, Colonic Neurosis, Color blindness, Colour blindness, Colpocephaly, Columnar-Like Esophagus, Combined Cone-Rod Degeneration, Combined
5 Immunodeficiency with Immunoglobulins, Combined Mesoectodermal Dysplasia, Common Variable Hypogammaglobulinemia, Common Variable Immunodeficiency, Common Ventricle, Communicating Hydrocephalus, Complete Absence of Hypoxanthine-Guanine Phosphoribosyltransferase, Complete Atrioventricular Septal Defect, Complement Component 1 Inhibitor Deficiency, Complement Component C1 Regulatory Component
10 Deficiency, Complete Heart Block, Complex Carbohydrate Intolerance, Complex Regional Pain Syndrome, Complex V ATP Synthase Deficiency, Complex I, Complex I NADH dehydrogenase deficiency, Complex II, Complex II Succinate dehydrogenase deficiency, Complex III, Complex III Ubiquinone-cytochrome c oxidoreductase deficiency, Complex IV, Complex IV Cytochrome c oxidase deficiency, Complex IV Deficiency, Complex V,
15 Cone-Rod Degeneration, Cone-Rod Degeneration Progressive, Cone Dystrophy, Cone-Rod Dystrophy, Confluent Reticular Papillomatosis, Congenital with low PK Kinetics, Congenital Absence of Abdominal Muscles, Congenital Absence of the Thymus and Parathyroids, Congenital Achromia, Congenital Addison's Disease, Congenital Adrenal Hyperplasia, Congenital Adrenal Hyperplasia, Congenital Afibrinogenemia, Congenital
20 Alveolar Hypoventilation, Congenital Anemia of Newborn, Congenital Bilateral Persylvian Syndrome, Congenital Brown Syndrome, Congenital Cardiovascular Defects, Congenital Central Hypoventilation Syndrome, Congenital Cerebral Palsy, Congenital Cervical Synostosis, Congenital Clapsed Thumb with Mental Retardation, Congenital Contractural Arachnodactyly, Congenital Contractures Multiple with Arachnodactyly,
25 Congenital Cyanosis, Congenital Defect of the Skull and Scalp, Congenital Dilatation of Intrahepatic Bile Duct, Congenital Dysmyelinating Neuropathy, Congenital Dysphagocytosis, Congenital Dysplastic Angiectasia, Congenital Erythropoietic Porphyria, Congenital Factor XIII Deficiency, Congenital Failure of Autonomic Control of Respiration, Congenital Familial Nonhemolytic Jaundice Type I, Congenital Familial
30 Protracted Diarrhea, Congenital Form Cockayne Syndrome Type II (Type B), Congenital Generalized Fibromatosis, Congenital German Measles, Congenital Giant Axonal

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Neuropathy, Congenital Heart Block, Congenital Heart Defects, Congenital Hemidysplasia with Ichthyosis Erythroderma and Limb Defects, Congenital Hemolytic Jaundice, Congenital Hemolytic Anemia, Congenital Hepatic Fibrosis, Congenital Hereditary Corneal Dystrophy, Congenital Hereditary Lymphedema, Congenital Hyperchondroplasia, 5 Congenital Hypomyelinating Polyneuropathy, Congenital Hypomyelination Neuropathy, Congenital Hypomyelination, Congenital Hypomyelination (Onion Bulb) Polyneuropathy, Congenital Ichthyosiform Erythroderma, Congenital Keratoconus, Congenital Lactic Acidosis, Congenital Lactose Intolerance, Congenital Lipodystrophy, Congenital Liver Cirrhosis, Congenital Lobar Emphysema, Congenital Localized Emphysema, Congenital 10 Macroglossia, Congenital Medullary Stenosis, Congenital Megacolon, Congenital Melanocytic Nevus, Congenital Mesodermal Dysmorphodystrophy, Congenital Mesodermal Dystrophy, Congenital Microvillus Atrophy, Congenital Multiple Arthrogryposis, Congenital Myotonic Dystrophy, Congenital Neuropathy caused by Hypomyelination, Congenital Pancytopenia, Congenital Pernicious Anemia, Congenital 15 Pernicious Anemia due to Defect of Intrinsic Factor, Congenital Pernicious Anemia due to Defect of Intrinsic Factor, Congenital Pigmentary Cirrhosis, Congenital Porphyria, Congenital Proximal myopathy Associated with Desmin Storage myopathy, Congenital Pulmonary Emphysema, Congenital Pure Red Cell Anemia, Congenital Pure Red Cell Aplasia, Congenital Retinal Blindness, Congenital Retinal Cyst, Congenital Retinitis 20 Pigmentosa, Congenital Retinoschisis, Congenital Rod Disease, Congenital Rubella Syndrome, Congenital Scalp Defects with Distal Limb Reduction Anomalies, Congenital Sensory Neuropathy, Congenital SMA with arthrogryposis, Congenital Spherocytic Anemia, Congenital Spondyloepiphyseal Dysplasia, Congenital Tethered Cervical Spinal Cord Syndrome, Congenital Tyrosinosis, Congenital Varicella Syndrome, Congenital 25 Vascular Cavernous Malformations, Congenital Vascular Veils in the Retina, Congenital Word Blindness, Congenital Wandering Spleen (Pediatric), Congestive Cardio myopathy, Conical Cornea, Conjugated Hyperbilirubinemia, Conjunctivitis, Conjunctivitis Ligneous, Conjunctivo-Urethro-Synovial Syndrome, Conn's Syndrome, Connective Tissue Disease, Conradi Disease, Conradi Hunermann Syndrome, Constitutional Aplastic Anemia, 30 Constitutional Erythroid Hypoplasia, Constitutional Eczema, Constitutional Liver Dysfunction, Constitutional Thrombopathy, Constricting Bands Congenital, Constrictive

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Pericarditis with Dwarfism, Continuous Muscle Fiber Activity Syndrome, Contractural Arachnodactyly, Contractures of Feet Muscle Atrophy and Oculomotor Apraxia, Convulsions, Cooley's anemia, Copper Transport Disease, Coproporphyrria Porphyrria Hepatica, Cor Triatriatum, Cor Triatriatum Sinistrum, Cor Triloculare Biatratrium, Cor Biloculare, Cori Disease, Cornea Dystrophy, Corneal Amyloidosis, Corneal Clouding-Cutis Laxa-Mental Retardation, Corneal Dystrophy, Cornelia de Lange Syndrome, Coronal Dentine Dysplasia, Coronary Artery Disease, Coronary Heart Disease, Corpus Callosum Agenesis, Cortical-Basal Ganglionic Degeneration, Corticalis Deformaris, Cortico-Basal Ganglionic Degeneration (CBGD), Corticobasal Degeneration, Corticosterone Methoxidase Deficiency Type I, Corticosterone Methyloxidase Deficiency Type II, Cortisol, Costello Syndrome, Cot Death, COVESDEM Syndrome, COX, COX Deficiency, COX Deficiency French-Canadian Type, COX Deficiency Infantile Mitochondrial myopathy de Toni-Fanconi-Debre included, COX Deficiency Type Benign Infantile Mitochondrial Myopathy, CP, CPEO, CPEO with myopathy, CPEO with Ragged-Red Fibers, CPPD Familial Form, CPT Deficiency, CPTD, Cranial Arteritis, Cranial Meningoencephalocele, Cranio-Oro-Digital Syndrome, Craniocarpotarsal dystrophy, Craniocoele, Craniodigital Syndrome-Mental Retardation Scott Type, Craniofacial Dysostosis, Craniofacial Dysostosis-PD Arteriosus-Hypertrichosis-Hypoplasia of Labia, Craniofrontonasal Dysplasia, Craniometaphyseal Dysplasia, Cranioorodigital Syndrome, Cranioorodigital Syndrome Type II, Craniostenosis Crouzon Type, Craniostenosis, Craniosynostosis-Choanal Atresia-Radial Humeral Synostosis, Craniosynostosis-Hypertrichosis-Facial and Other Anomalies, Craniosynostosis Midfacial Hypoplasia and Foot Abnormalities, Craniosynostosis Primary, Craniosynostosis-Radial Aplasia Syndrome, Craniosynostosis with Radial Defects, Cranium Bifidum, CREST Syndrome, Creutzfeldt Jakob Disease, Cri du Chat Syndrome, Crib Death, Crigler Najjar Syndrome Type I, Crohn's Disease, Cronkhite-Canada Syndrome, Cross Syndrome, Cross' Syndrome, Cross-McKusick-Breen Syndrome, Crouzon, Crouzon Syndrome, Crouzon Craniofacial Dysostosis, Cryoglobulinemia Essential Mixed, Cryptophthalmos-Syndactyly Syndrome, Cryptorchidism-Dwarfism-Subnormal Mentality, Crystalline Corneal Dystrophy of Schnyder, CS, CSD, CSID, CSO, CST Syndrome, Curly Hair-Ankyloblepharon-Nail Dysplasia, Curschmann-Batten-Steinert Syndrome, Curth Macklin

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Type Ichthyosis Hystric, Curth-Macklin Type, Cushing's, Cushing Syndrome, Cushing's III, Cutaneous Malignant Melanoma Hereditary, Cutaneous Porphyrias, Cutis Laxa, Cutis Laxa-Growth Deficiency Syndrome, Cutis Marmorata Telangiectatica Congenita, CVI, CVID, CVS, Cyclic vomiting syndrome, Cystic Disease of the Renal Medulla, Cystic Hygroma, Cystic Fibrosis, Cystic Lymphangioma, Cystine-Lysine-Arginine-Ornithinuria, Cystine Storage Disease, Cystinosis, Cystinuria, Cystinuria with Dibasic Aminoaciduria, Cystinuria Type I, Cystinuria Type II, Cystinuria Type III, Cysts of the Renal Medulla Congenital, Cytochrome C Oxidase Deficiency, D.C., Dacryosialoadenopathy, Dacryosialoadenopathia, Dalpro, Dalton, Daltonism, Danbolt-Cross Syndrome, Dancing Eyes-Dancing Feet Syndrome, Dandy-Walker Syndrome, Dandy-Walker Cyst, Dandy-Walker Deformity, Dandy Walker Malformation, Danish Cardiac Type Amyloidosis (Type III), Darier Disease, Davidson's Disease, Davies' Disease, DBA, DBS, DC, DD, De Barsy Syndrome, De Barsy-Moens-Diercks Syndrome, de Lange Syndrome, De Morsier Syndrome, De Santis Cacchione Syndrome, de Toni-Fanconi Syndrome, Deafness Congenital and Functional Heart Disease, Deafness-Dwarfism-Retinal Atrophy, Deafness-Functional Heart Disease, Deafness Onychodystrophy Osteodystrophy and Mental Retardation, Deafness and Pili Torti Bjornstad Type, Deafness Sensorineural with Imperforate Anus and Hypoplastic Thumbs, Debrancher Deficiency, Deciduous Skin, Defect of Enterocyte Intrinsic Factor Receptor, Defect in Natural Killer Lymphocytes, Defect of Renal Reabsorption of Carnitine, Deficiency of Glycoprotein Neuraminidase, Deficiency of Mitochondrial Respiratory Chain Complex IV, Deficiency of Platelet Glycoprotein Ib, Deficiency of Von Willebrand Factor Receptor, Deficiency of Short-Chain Acyl-CoA Dehydrogenase (ACADS), Deformity with Mesomelic Dwarfism, Degenerative Chorea, Degenerative Lumbar Spinal Stenosis, Degos Disease, Degos-Kohlmeier Disease, Degos Syndrome, DEH, Dejerine-Roussy Syndrome, Dejerine Sottas Disease, Deletion 9p Syndrome Partial, Deletion 11q Syndrome Partial, Deletion 13q Syndrome Partial, Delleman-Oorthuys Syndrome, Delleman Syndrome, Dementia with Lobar Atrophy and Neuronal Cytoplasmic Inclusions, Demyelinating Disease, DeMyer Syndrome, Dentin Dysplasia Coronal, Dentin Dysplasia Radicular, Dentin Dysplasia Type I, Dentin Dysplasia Type II, Dentinogenesis Imperfecta Brandywine type, Dentinogenesis Imperfecta Shields Type, Dentinogenesis Imperfecta Type III, Dento-Oculo-Osseous

Dysplasia, Dentooculocutaneous Syndrome, Denys-Drash Syndrome, Depakene,
 DepakeneTM exposure, Depakote, Depakote Sprinkle, Depigmentation-Gingival
 Fibromatosis-Microphthalmia, Dercum Disease, Dermatitis Atopic, Dermatitis Exfoliativa,
 Dermatitis Herpetiformis, Dermatitis Multiformis, Dermatochalasia Generalized,
 5 Dermatology Generalized, Dermatomegaly, Dermatomyositis sine myositis,
 Dermatomyositis, Dermatosparaxis, Dermatostomatitis Stevens Johnson Type, Desbuquois
 Syndrome, Desmin Storage myopathy, Desquamation of Newborn, Deuteranomaly,
 Developmental Reading Disorder, Developmental Gerstmann Syndrome, Devergie
 Disease, Devic Disease, Devic Syndrome, Dextrocardia- Bronchiectasis and Sinusitis,
 10 Dextrocardia with Situs Inversus, DGS, DGSX Golabi-Rosen Syndrome Included, DH,
 DHAP alkyl transferase deficiency, DHBS Deficiency, DHOF, DHPR Deficiency,
 Diabetes Insipidus, Diabetes Insipidus Diabetes Mellitus Optic Atrophy and Deafness,
 Diabetes Insipidus Neurohypophyseal, Diabetes Insulin Dependent, Diabetes Mellitus,
 Diabetes Mellitus Addison's Disease Myxedema, Diabetic Acidosis, Diabetic Bearded
 15 Woman Syndrome, Diamond-Blackfan Anemia, Diaphragmatic Apnea, Diaphyseal
 Aclasis, Diastrophic Dwarfism, Diastrophic Dysplasia, Diastrophic Nanism Syndrome,
 Dicarboxylic Aminoaciduria, Dicarboxylicaciduria Caused by Defect in Beta-Oxidation of
 Fatty Acids, Dicarboxylicaciduria due to Defect in Beta-Oxidation of Fatty Acids,
 Dicarboxylicaciduria due to MCADH Deficiency, Dichromasy, Dicker-Opitz, DIDMOAD,
 20 Diencephalic Syndrome, Diencephalic Syndrome of Childhood, Diencephalic Syndrome of
 Emaciation, Dienoyl-CoA Reductase Deficiency, Diffuse Cerebral Degeneration in
 Infancy, Diffuse Degenerative Cerebral Disease, Diffuse Idiopathic Skeletal Hyperostosis,
 Diffusum-Glycopeptiduria, DiGeorge Syndrome, Digital-Oro-Cranio Syndrome, Digito-
 Oto-Palatal Syndrome, Digito-Oto-Palatal Syndrome Type I, Digito-Oto-Palatal Syndrome
 25 Type II, Dihydrobiopterin Synthetase Deficiency, Dihydropteridine Reductase Deficiency,
 Dihydroxyacetonephosphate synthase, Dilated (Congestive) Cardio myopathy, Dimitri
 Disease, Diplegia of Cerebral Palsy, Diplo-Y Syndrome, Disaccharidase Deficiency,
 Disaccharide Intolerance I, Discoid Lupus, Discoid Lupus Erythematosus, DISH, Disorder
 of Cornification, Disorder of Cornification Type I, Disorder of Cornification 4, Disorder of
 30 Cornification 6, Disorder of Cornification 8, Disorder of Cornification 9 Netherton's Type,
 Disorder of Cornification 11 Phytanic Acid Type, Disorder of Cornification 12 (Neutral

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Lipid Storage Type), Disorder of Cornification 13, Disorder of Cornification 14, Disorder
 of Cornification 14 Trichothiodystrophy Type, Disorder of Cornification 15 (Keratitis
 Deafness Type), Disorder of Cornification 16, Disorder of Cornification 18
 Erythrodermia Variabilis Type, Disorder of Cornification 19, Disorder of
 5 Cornification 20, Disorder of Cornification 24, Displaced Spleen, Disseminated Lupus
 Erythematosus, Disseminated Neurodermatitis, Disseminated Sclerosis, Distal 11q
 Monosomy, Distal 11q- Syndrome, Distal Arthrogryposis Multiplex Congenita Type IIA,
 Distal Arthrogryposis Multiplex Congenita Type IIA, Distal Arthrogryposis Type IIA,
 Distal Arthrogryposis Type 2A, Distal Duplication 6q, Distal Duplication 10q, Dup(10q)
 10 Syndrome, Distal Duplication 15q, Distal Monosomy 9p, Distal Trisomy 6q, Distal
 Trisomy 10q Syndrome, Distal Trisomy 11q, Divalproex, DJS, DKC, DLE, DLPIII, DM,
 DMC Syndrome, DMC Disease, DMD, DNS Hereditary, DOC I, DOC 2, DOC 4, DOC 6
 (Harlequin Type), DOC 8 Curth-Macklin Type, DOC 11 Phytanic Acid Type, DOC 12
 (Neutral Lipid Storage Type), DOC 13, DOC 14, DOC 14 Trichothiodystrophy Type,
 15 DOC 15 (Keratitis Deafness Type), DOC 16, DOC 16 Unilateral Hemidysplasia Type,
 DOC 18, DOC 19, DOC 20, DOC 24, Dohle's Bodies-Myelopathy, Dolichospondylic
 Dysplasia, Dolichostenomelia, Dolichostenomelia Syndrome, Dominant Type Kenny-
 Caffé Syndrome, Dominant Type Myotonia Congenita, Donahue Syndrome, Donath-
 Landsteiner Hemolytic Anemia, Donath-Landsteiner Syndrome, DOOR Syndrome,
 20 DOORS Syndrome, Dopa-responsive Dystonia (DRD), Dorfman Chanarin Syndrome,
 Dowling-Meara Syndrome, Down Syndrome, DR Syndrome, Drash Syndrome, DRD,
 Dreifuss-Emery Type Muscular Dystrophy with Contractures, Dressler Syndrome, Drifting
 Spleen, Drug-induced Acanthosis Nigricans, Drug-induced Lupus Erythematosus, Drug-
 related Adrenal Insufficiency, Drummond's Syndrome, Dry Beriberi, Dry Eye, DTD,
 25 Duane's Retraction Syndrome, Duane Syndrome, Duane Syndrome Type IA 1B and 1C,
 Duane Syndrome Type 2A 2B and 2C, Duane Syndrome Type 3A 3B and 3C, Dubin
 Johnson Syndrome, Dubowitz Syndrome, Duchenne, Duchenne Muscular Dystrophy,
 Duchenne's Paralysis, Duhning's Disease, Duncan Disease, Duncan's Disease, Duodenal
 Atresia, Duodenal Stenosis, Duodenitis, Duplication 4p Syndrome, Duplication 6q Partial,
 30 Dupuy's Syndrome, Dupuytren's Contracture, Dutch-Kennedy Syndrome, Dwarfism,
 Dwarfism Campomelic, Dwarfism Cortical Thickening of the Tubular Bones & Transient

Hypocalcemia, Dwarfism Levi's Type, Dwarfism Metatropic, Dwarfism-Onychodysplasia, Dwarfism-Pericarditis, Dwarfism with Renal Atrophy and Deafness, Dwarfism with Rickets, DWM, Dyggve Melchior Clausen Syndrome, Dysautonomia Familial, Dysbetalipoproteinemia Familial, Dyschondrodysplasia with Hemangiomas, 5 Dyschondrosteosis, Dyschromatosis Universalis Hereditaria, Dysencephalia Splanchnocystica, Dyskeratosis Congenita, Dyskeratosis Congenita Autosomal Recessive, Dyskeratosis Congenita Scoggins Type, Dyskeratosis Congenita Syndrome, Dyskeratosis Follicularis Vegetans, Dyslexia, Dysmyelogenic Leukodystrophy, Dysmyelogenic Leukodystrophy-Megalobare, Dysphonia Spastica, Dysplasia Epiphysialis Punctata, 10 Dysplasia Epiphyseal Hemimelica, Dysplasia of Nails With Hypodontia, Dysplasia Cleidocranial, Dysplasia Fibrous, Dysplasia Gigantism SyndromeX-Linked, Dysplasia Osteodental, Dysplastic Nevus Syndrome, Dysplastic Nevus Type, Dyssynergia Cerebellaris Myoclonica, Dyssynergia Esophagus, Dystonia, Dystopia Canthorum, Dystrophia Adiposogenitalis, Dystrophia Endothelialis Cornea, Dystrophia Mesodermalis, 15 Dystrophic Epidermolysis Bullosa, Dystrophy, Asphyxiating Thoracic, Dystrophy Myotonic, E-D Syndrome, Eagle-Barrett Syndrome, Eales Retinopathy, Eales Disease, Ear Anomalies-Contractures-Dysplasia of Bone with Kyphoscoliosis, Ear Patella Short Stature Syndrome, Early Constraint Defects, Early Hypercalcemia Syndrome with Elfin Facie, Early-onset Dystonia, Eaton Lambert Syndrome, EB, Epstein's anomaly, EBV 20 Susceptibility (EBVS), EBVS, ECD, ECPSG, Ectodermal Dysplasias, Ectodermal Dysplasia Anhidrotic with Cleft Lip and Cleft Palate, Ectodermal Dysplasia-Exocrine Pancreatic Insufficiency, Ectodermal Dysplasia Rapp-Hodgkin type, Ectodermal and Mesodermal Dysplasia Congenital, Ectodermal and Mesodermal Dysplasia with Osseous Involvement, Ectodermosis Erosiva Pluriorificialis, Ectopia Lentis, Ectopia Vesicae, 25 Ectopic ACTH Syndrome, Ectopic Adrenocorticotrophic Hormone Syndrome, Ectopic Anus, Ectrodactilia of the Hand, Ectrodactyly, Ectrodactyly-Ectodermal Dysplasia-Clefting Syndrome, Ectrodactyly Ectodermal Dysplasias Clefting Syndrome, Ectrodactyly Ectodermal Dysplasia Cleft Lip/Cleft Palate, Eczema, Eczema-Thrombocytopenia-Immunodeficiency Syndrome, EDA, EDMD, EDS, EDS Arterial-Ecchymotic Type, EDS 30 Arthrochalasia, EDS Classic Severe Form, EDS Dysfibronectinemic, EDS Gravis Type, EDS Hypermobility, EDS Kyphoscoliotic, EDS Kyphoscoliosis, EDS Mitis Type, EDS

Ocular-Scoliotic, EDS Progeroid, EDS Periodontosis, EDS Vascular, EEC Syndrome, EFE, EHBA, EHK, Ehlers Danlos Syndrome, Ehlers-Danlos syndrome, Ehlers Danlos IX, Eisenmenger Complex, Eisenmenger's complex, Eisenmenger Disease, Eisenmenger Reaction, Eisenmenger Syndrome, Ekblom Syndrome, Ekman-Lobstein Disease,

5 Ektrodactyly of the Hand, EKV, Elastin fiber disorders, Elastorrhexis Generalized, Elastosis Dystrophica Syndrome, Elective Mutism (obsolete), Elective Mutism, Electrocardiogram (ECG or EKG), Electron Transfer Flavoprotein (ETF) Dehydrogenase Deficiency: (GAII & MADD), Electrophysiologic study (EPS), Elephant Nails From Birth, Elephantiasis Congenita Angiomatosa, Hemangiectatic Hypertrophy, Elfin Facies with

10 Hypercalcemia, Ellis-van Creveld Syndrome, Ellis Van Creveld Syndrome, Embryoma Kidney, Embryonal Adenomyosarcoma Kidney, Embryonal Carcinosarcoma Kidney, Embryonal Mixed Tumor Kidney, EMC, Emery Dreyfus Muscular Dystrophy, Emery-Dreifuss Muscular Dystrophy, Emery-Dreifuss Syndrome, EMF, EMG Syndrome, Empty Sella Syndrome, Encephalitis Periaxialis Diffusa, Encephalitis Periaxialis Concentrica,

15 Encephalocele, Encephalofacial Angiomatosis, Encephalopathy, Encephalotrigeminal Angiomatosis, Enchondromatosis with Multiple Cavernous Hemangiomas, Endemic Polyneuritis, Endocardial Cushion Defect, Endocardial Cushion Defects, Endocardial Dysplasia, Endocardial Fibroelastosis (EFE), Endogenous Hypertriglyceridemia, Endolymphatic Hydrops, Endometrial Growths, Endometriosis, Endomyocardial Fibrosis,

20 Endothelial Corneal Dystrophy Congenital, Endothelial Epithelial Corneal Dystrophy, Endothelium, Engelmann Disease, Enlarged Tongue, Enterocolitis, Enterocyte Cobalamin Malabsorption, Eosinophilia Syndrome, Eosinophilic Cellulitis, Eosinophilic Fasciitis, Eosinophilic Granuloma, Eosinophilic Syndrome, Epidermal Nevus Syndrome, Epidermolysis Bullosa, Epidermolysis Bullosa Acquisita, Epidermolysis Bullosa

25 Hereditaria, Epidermolysis Bullosa Letalias, Epidermolysis Hereditaria Tarda, Epidermolytic Hyperkeratosis, Epidermolytic Hyperkeratosis (Bullous CIE), Epilepsia Procursiva, Epilepsy, Epinephrine, Epiphyseal Changes and High Myopia, Epiphyseal Osteochondroma Benign, Epiphysealis Hemimelica Dysplasia, Episodic-Abnormal Eye Movement, Epithelial Basement Membrane Corneal Dystrophy, Epithelial Corneal

30 Dystrophy of Meesmann Juvenile, Epitheliomatosis Multiplex with Nevus, Epithelium, Epival, EPS, Epstein-Barr Virus-Induced Lymphoproliferative Disease in Males, Erb-

Goldflam syndrome, Erdheim Chester Disease, Erythema Multiforme Exudativum, Erythema Polymorphe Stevens Johnson Type, Erythroblastophthisis, Erythroblastosis Fetalis, Erythroblastosis Neonatorum, Erythroblastotic Anemia of Childhood, Erythrocyte Phosphoglycerate Kinase Deficiency, Erythrogenesis Imperfecta, Erythrokeratoderma

5 Progressiva Symmetrica, Erythrokeratoderma Progressiva Symmetrica Ichthyosis, Erythrokeratoderma Variabilis, Erythrokeratoderma Variabilis Type, Erythrokeratolysis Hiemalis, Erythropoietic Porphyrias, Erythropoietic Porphyria, Escobar Syndrome, Esophageal Atresia, Esophageal Aperistalsis, Esophagitis-Peptic Ulcer, Esophagus Atresia and/or Tracheoesophageal Fistula, Essential Familial Hyperlipemia, Essential Fructosuria,

10 Essential Hematuria, Essential Hemorrhagic Thrombocythemia, Essential Mixed Cryoglobulinemia, Essential Moschowitz Disease, Essential Thrombocythemia, Essential Thrombocytopenia, Essential Thrombocytosis, Essential Tremor, Esterase Inhibitor Deficiency, Estren-Dameshek variant of Fanconi Anemia, Estrogen-related Cholestasis, ET, ETF, Ethylmalonic Adipicaciduria, Eulenburg Disease, pc, EVCS, Exaggerated Startle

15 Reaction, Exencephaly, Exogenous Hypertriglyceridemia, Exomphalos-Macroglossia-Gigantism Syndrom, Exophthalmic Goiter, Expanded Rubella Syndrome, Exstrophy of the Bladder, EXT, External Chondromatosis Syndrome, Extrahepatic Biliary Atresia, Extramedullary Plasmacytoma, Exudative Retinitis, Eye Retraction Syndrome, FA1, FAA, Fabry Disease, FAC, FACB, FACD, FACE, FACF, FACG, FACH, Facial Nerve Palsy,

20 Facial Paralysis, Facial Ectodermal Dysplasias, Facial Ectodermal Dysplasia, Facio-Scapulo-Humeral Dystrophy, Facio-Auriculo-Vertebral Spectrum, Facio-cardio-cutaneous syndrome, Facio-Fronto-Nasal Dysplasia, Faciocutaneoskeletal Syndrome, Faciodigitogenital syndrome, Faciogenital dysplasia, Faciogenitopopliteal Syndrome, Faciopalatoosseous Syndrome, Faciopalatoosseous Syndrome Type II,

25 Facioscapulohumeral muscular dystrophy, Factitious Hypoglycemia, Factor VIII Deficiency, Factor IX Deficiency, Factor XI Deficiency, Factor XII deficiency, Factor XIII Deficiency, Fahr Disease, Fahr's Disease, Failure of Secretion Gastric Intrinsic Factor, Fairbank Disease, Fallot's Tetralogy, Familial Acrogeria, Familial Acromicria, Familial Adenomatous Colon Polyposis, Familial Adenomatous Polyposis with Extraintestinal

30 Manifestations, Familial Alobar Holoprosencephaly, Familial Alpha-Lipoprotein Deficiency, Familial Amyotrophic Chorea with Acanthocytosis, Familial Arrhythmic

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Myoclonus, Familial Articular Chondrocalcinosis, Familial Atypical Mole-Malignant Melanoma Syndrome, Familial Broad Beta Disease, Familial Calcium Gout, Familial Calcium Pyrophosphate Arthropathy, Familial Chronic Obstructive Lung Disease, Familial Continuous Skin Peeling, Familial Cutaneous Amyloidosis, Familial Dysproteinemia, 5 Familial Emphysema, Familial Enteropathy Microvillus, Familial Foveal Retinoschisis, Familial Hibernation Syndrome, Familial High Cholesterol, Familial Hemochromatosis, Familial High Blood Cholesterol, Familial High-Density Lipoprotein Deficiency, Familial High Serum Cholesterol, Familial Hyperlipidemia, Familial Hypoproteinemia with Lymphangietatic Enteropathy, Familial Jaundice, Familial Juvenile Nephronophthisis- 10 Associated Ocular Anomaly, Familial Lichen Amyloidosis (Type IX), Familial Lumbar Stenosis, Familial Lymphedema Praecox, Familial Mediterranean Fever, Familial Multiple Polyposis, Familial Nuchal Bleb, Familial Paroxysmal Polyserositis, Familial Polyposis Coli, Familial Primary Pulmonary Hypertension, Familial Renal Glycosuria, Familial Splenic Anemia, Familial Startle Disease, Familial Visceral Amyloidosis (Type VIII), 15 FAMMM, FANCA, FANCB, FANCC, FANCD, FANCE, Fanconi Panmyelopathy, Fanconi Pancytopenia, Fanconi II, Fanconi's Anemia, Fanconi's Anemia Type I, Fanconi's Anemia Complementation Group, Fanconi's Anemia Complementation Group A, Fanconi's Anemia Complementation Group B, Fanconi's Anemia Complementation Group C, Fanconi's Anemia Complementation Group D, Fanconi's Anemia Complementation 20 Group E, Fanconi's Anemia Complementation Group G, Fanconi's Anemia Complementation Group H, Fanconi's Anemia Estren-Dameshek Variant, FANF, FANG, FANH, FAP, FAPG, Farber's Disease, Farber's Lipogranulomatosis, FAS, Fasting Hypoglycemia, Fat-Induced Hyperlipemia, Fatal Granulomatous Disease of Childhood, Fatty Oxidation Disorders, Fatty Liver with Encephalopathy, FAV, FCH, FCMD, FCS 25 Syndrome, FD, FDH, Febrile Mucocutaneous Syndrome Stevens Johnson Type, Febrile Neutrophilic Dermatitis Acute, Febrile Seizures, Feinberg's syndrome, Feissinger-Leroy-Reiter Syndrome, Female Pseudo-Turner Syndrome, Femoral Dysgenesis Bilateral-Robin Anomaly, Femoral Dysgenesis Bilateral, Femoral Facial Syndrome, Femoral Hypoplasia-Unusual Facies Syndrome, Fetal Alcohol Syndrome, Fetal Anti-Convulsant Syndrome, 30 Fetal Cystic Hygroma, Fetal Effects of Alcohol, Fetal Effects of Chickenpox, Fetal Effects of Thalidomide, Fetal Effects of Varicella Zoster Virus, Fetal Endomyocardial Fibrosis,

Fetal Face Syndrome, Fetal Iritis Syndrome, Fetal Transfusion Syndrome, Fetal Valproate Syndrome, Fetal Valproic Acid Exposure Syndrome, Fetal Varicella Infection, Fetal Varicella Zoster Syndrome, FFDD Type II, FG Syndrome, FGDY, FHS, Fibrin Stabilizing Factor Deficiency, Fibrinase Deficiency, Fibrinoid Degeneration of Astrocytes, Fibrinoid
 5 Leukodystrophy, Fibrinoligase Deficiency, Fibroblastoma Perineural, Fibrocystic Disease of Pancreas, Fibrodysplasia Ossificans Progressiva, Fibroelastic Endocarditis, Fibromyalgia, Fibromyalgia-Fibromyositis, Fibromyositis, Fibrosing Cholangitis, Fibrositis, Fibrous Ankylosis of Multiple Joints, Fibrous Caverositis, Fibrous Dysplasia, Fibrous Plaques of the Penis, Fibrous Sclerosis of the Penis, Fickler-Winkler Type, Fiedler
 10 Disease, Fifth Digit Syndrome, Filippi Syndrome, Finnish Type Amyloidosis (Type V), First Degree Congenital Heart Block, First and Second Branchial Arch Syndrome, Fischer's Syndrome, Fish Odor Syndrome, Fissured Tongue, Flat Adenoma Syndrome, Flatau-Schilder Disease, Flavin Containing Monooxygenase 2, Floating Beta Disease, Floating-Harbor Syndrome, Floating Spleen, Floppy Infant Syndrome, Floppy Valve
 15 Syndrome, Fluent aphasia, FMD, FMF, FMO Adult Liver Form, FMO2, FND, Focal Dermal Dysplasia Syndrome, Focal Dermal Hypoplasia, Focal Dermato-Phalangeal Dysplasia, Focal Dystonia, Focal Epilepsy, Focal Facial Dermal Dysplasia Type II, Focal Neuromyotonia, FODH, Folling Syndrome, Fong Disease, FOP, Forbes Disease, Forbes-Albright Syndrome, Forestier's Disease, Forsius-Eriksson Syndrome (X-Linked),
 20 Fothergill Disease, Fountain Syndrome, Foveal Dystrophy Progressive, FPO Syndrome Type II, FPO, Fraccaro Type Achondrogenesis (Type IB), Fragile X syndrome, Franceschetti-Zwahlen-Klein Syndrome, Francois Dyscephaly Syndrome, Francois-Neetens Speckled Dystrophy, Flecked Corneal Dystrophy, Fraser Syndrome, FRAXA, FRDA, Fredrickson Type I Hyperlipoproteinemia, Freeman-Sheldon Syndrome, Freire-Maia
 25 Syndrome, Frey's Syndrome, Friedreich's Ataxia, Friedreich's Disease, Friedreich's Tabes, FRNS, Froelich's Syndrome, Frommel-Chiari Syndrome, Frommel-Chiari Syndrome Lactation-Uterus Atrophy, Frontodigital Syndrome, Frontofacionasal Dysostosis, Frontofacionasal Dysplasia, Frontonasal Dysplasia, Frontonasal Dysplasia with Coronal Craniosynostosis, Fructose-1-Phosphate Aldolase Deficiency, Fructosemia,
 30 Fructosuria, Fryns Syndrome, FSH, FSHD, FSS, Fuchs Dystrophy, Fucosidosis Type 1, Fucosidosis Type 2, Fucosidosis Type 3, Fukuhara Syndrome, Fukuyama Disease,

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Fukuyama Type Muscular Dystrophy, Fumarylacetoacetase deficiency, Furrowed Tongue,
 G Syndrome, G6PD Deficiency, G6PD, GA I, GA IIB, GA IIA, GA II, GAI & MADD,
 Galactorrhea-Amenorrhea Syndrome Nonpuerperal, Galactorrhea-Amenorrhea without
 Pregnancy, Galactosamine-6-Sulfatase Deficiency, Galactose-1-Phosphate Uridyl
 5 Transferase Deficiency, Galactosemia, GALB Deficiency, Galloway-Mowat Syndrome,
 Galloway Syndrome, GALT Deficiency, Gammaglobulin Deficiency, GAN, Ganglioside
 Neuraminidase Deficiency, Ganglioside Sialidase Deficiency, Gangliosidosis GM1 Type
 1, Gangliosidosis GM2 Type 2, Gangliosidosis Beta Hexosaminidase B Deficiency,
 Gardner Syndrome, Gargoylism, Garies-Mason Syndrome, Gasser Syndrome, Gastric
 10 Intrinsic Factor Failure of Secretion, Enterocyte Cobalamin, Gastrinoma, Gastritis,
 Gastroesophageal Laceration-Hemorrhage, Gastrointestinal Polyposis and Ectodermal
 Changes, Gastroschisis, Gaucher Disease, Gaucher-Schlagenhauser, Gayet-Wernicke
 Syndrome, GBS, GCA, GCM Syndrome, GCPS, Gee-Herter Disease, Gee-Thaysen
 Disease, Gehrig's Disease, Gelineau's Syndrome, Genee-Wiedemann Syndrome,
 15 Generalized Dystonia, Generalized Familial Neuromyotonia, Generalized Fibromatosis,
 Generalized Flexion Epilepsy, Generalized Glycogenosis, Generalized Hyperhidrosis,
 Generalized Lipofuscinosis, Generalized Myasthenia Gravis, Generalized Myotonia,
 Generalized Sporadic Neuromyotonia, Genetic Disorders, Genital Defects, Genital and
 Urinary Tract Defects, Gerstmann Syndrome, Gerstmann Tetrad, GHBP, GHD, GHR,
 20 Giant Axonal Disease, Giant Axonal Neuropathy, Giant Benign Lymphoma, Giant Cell
 Glioblastoma Astrocytoma, Giant Cell Arteritis, Giant Cell Disease of the Liver, Giant
 Cell Hepatitis, Giant Cell of Newborns Cirrhosis, Giant Cyst of the Retina, Giant Lymph
 Node Hyperplasia, Giant Platelet Syndrome Hereditary, Giant Tongue, giant Macular
 Dystrophy, Gilbert's Disease, Gilbert Syndrome, Gilbert-Dreyfus Syndrome, Gilbert-
 25 Lereboullet Syndrome, Gilford Syndrome, Gilles de la Tourette's syndrome, Gillespie
 Syndrome, Gingival Fibromatosis-Abnormal Fingers Nails Nose Ear Splenomegaly, GLA
 Deficiency, GLA, GLB1, Glioma Retina, Global aphasia, Globoid Leukodystrophy,
 Glossoptosis Micrognathia and Cleft Palate, Glucocerebrosidase deficiency,
 Glucocerebrosidosis, Glucose-6-Phosphate Dehydrogenase Deficiency, Glucose-6-
 30 Phosphate Transport Defect, Glucose-6-Phosphate Translocase Deficiency, Glucose-6-
 Phosphatase Deficiency, Glucose-Galactose Malabsorption, Glucosyl Ceramide Lipidosis,

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Glutaric Aciduria I, Glutaric Acidemia I, Glutaric Acidemia II, Glutaric Aciduria II,
 Glutaric Aciduria Type II, Glutaric Aciduria Type III, Glutaricacidemia I,
 Glutaricacidemia II, Glutaricaciduria I, Glutaricaciduria II, Glutaricaciduria Type IIA,
 Glutaricaciduria Type IIB, Glutaryl-CoA Dehydrogenase Deficiency, Glutaurate-Aspartate
 5 Transport Defect, Gluten-Sensitive Enteropathy, Glycogen Disease of Muscle Type VII,
 Glycogen Storage Disease I, Glycogen Storage Disease III, Glycogen Storage Disease IV,
 Glycogen Storage Disease Type V, Glycogen Storage Disease VI, Glycogen Storage
 Disease VII, Glycogen Storage Disease VIII, Glycogen Storage Disease Type II, Glycogen
 Storage Disease-Type II, Glycogenosis, Glycogenosis Type I, Glycogenosis Type IA,
 10 Glycogenosis Type IB, Glycogenosis Type II, Glycogenosis Type II, Glycogenosis Type
 III, Glycogenosis Type IV, Glycogenosis Type V, Glycogenosis Type VI, Glycogenosis
 Type VII, Glycogenosis Type VIII, Glycolic Aciduria, Glycolipid Lipidosis, GM2
 Gangliosidosis Type 1, GM2 Gangliosidosis Type 1, GNPTA, Goitrous Autoimmune
 Thyroiditis, Goldenhar Syndrome, Goldenhar-Gorlin Syndrome, Goldscheider's Disease,
 15 Goltz Syndrome, Goltz-Gorlin Syndrome, Gonadal Dysgenesis 45 X, Gonadal Dysgenesis
 XO, Goniodysgenesis-Hypodontia, Goodman Syndrome, Goodman, Goodpasture
 Syndrome, Gordon Syndrome, Gorlin's Syndrome, Gorlin-Chaudhry-Moss Syndrome,
 Gottron Erythrokeratoderma Congenitalis Progressiva Symmetrica, Gottron's Syndrome,
 Gougerot-Carteaud Syndrome, Grand Mal Epilepsy, Granular Type Corneal Dystrophy,
 20 Granulomatous Arteritis, Granulomatous Colitis, Granulomatous Dermatitis with
 Eosinophilia, Granulomatous Ileitis, Graves Disease, Graves' Hyperthyroidism, Graves'
 Disease, Greig Cephalopolysyndactyly Syndrome, Groenouw Type I Corneal Dystrophy,
 Groenouw Type II Corneal Dystrophy, Gronblad-Strandberg Syndrome, Grotton
 Syndrome, Growth Hormone Receptor Deficiency, Growth Hormone Binding Protein
 25 Deficiency, Growth Hormone Deficiency, Growth-Mental Deficiency Syndrome of Myhre,
 Growth Retardation-Rieger Anomaly, GRS, Gruber Syndrome, GS, GSD6, GSD8, GTS,
 Guanosine Triphosphate-Cyclohydrolase Deficiency, Guanosine Triphosphate-
 Cyclohydrolase Deficiency, Guenther Porphyria, Guerin-Stern Syndrome, Guillain-Barré,
 Guillain-Barre Syndrome, Gunther Disease, H Disease, H. Gottron's Syndrome, Habit
 30 Spasms, HAE, Hageman Factor Deficiency, Hageman factor, Haim-Munk Syndrome,
 Hajdu-Cheney Syndrome, Hajdu Cheney, HAL Deficiency, Hall-Pallister Syndrome,

Hallermann-Streiff-Francois syndrome, Hallermann-Streiff Syndrome, Hallervorden-Spatz
 Disease, Hallervorden-Spatz Syndrome, Hallopeau-Siemens Disease, Hallux Duplication
 Postaxial Polydactyly and Absence of Corpus Callosum, Halushi-Behcet's Syndrome,
 Hamartoma of the Lymphatics, Hand-Schueller-Christian Syndrome, HANE, Hanhart
 5 Syndrome, Happy Puppet Syndrome, Harada Syndrome, HARD +/-E Syndrome, HARD
 Syndrome, Hare Lip, Harlequin Fetus, Harlequin Type DOC 6, Harlequin Type Ichthyosis,
 Harley Syndrome, Harrington Syndrome, Hart Syndrome, Hartnup Disease, Hartnup
 Disorder, Hartnup Syndrome, Hashimoto's Disease, Hashimoto-Pritzker Syndrome,
 Hashimoto's Syndrome, Hashimoto's Thyroiditis, Hashimoto-Pritzker Syndrome, Hay
 10 Well's Syndrome, Hay-Wells Syndrome of Ectodermal Dysplasia, HCMM, HCP, HCTD,
 HD, Heart-Hand Syndrome (Holt-Oram Type), Heart Disease, Hecht Syndrome, HED,
 Heerferdt-Waldenstrom and Lofgren's Syndromes, Hegglin's Disease, Heinrichsbauer
 Syndrome, Hemangiomas, Hemangioma Familial, Hemangioma-Thrombocytopenia
 Syndrome, Hemangiomatosis Chondrodystrophica, Hemangiomatous Branchial Clefts-Lip
 15 Pseudocleft Syndrome, Hemifacial Microsomia, Hemimegalencephaly, Hemiparesis of
 Cerebral Palsy, Hemiplegia of Cerebral Palsy, Hemisection of the Spinal Cord,
 Hemochromatosis, Hemochromatosis Syndrome, Hemodialysis-Related Amyloidosis,
 Hemoglobin Lepore Syndromes, Hemolytic Anemia of Newborn, Hemolytic Cold
 Antibody Anemia, Hemolytic Disease of Newborn, Hemolytic-Uremic Syndrome,
 20 Hemophilia, Hemophilia A, Hemophilia B, Hemophilia B Factor IX, Hemophilia C,
 Hemorrhagic Dystrophic Thrombocytopenia, Hemorrhagica Aleukia, Hemosiderosis,
 Hepatic Fructokinase Deficiency, Hepatic Phosphorylase Kinase Deficiency, Hepatic
 Porphyrin, Hepatic Porphyrins, Hepatic Veno-Occlusive Diseases, Hepato-Renal Syndrome,
 Hepatolenticular Degeneration, Hepatophosphorylase Deficiency, Hepatorenal
 25 Glycogenosis, Hepatorenal Syndrome, Hepatorenal Tyrosinemia, Hereditary
 Acromelalgia, Hereditary Alkaptonuria, Hereditary Amyloidosis, Hereditary Angioedema,
 Hereditary Areflexic Dystasia, Hereditary Ataxia Polyneuritiformis, Hereditary
 Ataxia, Hereditary Ataxia Friedrich's Type, Hereditary Benign Acanthosis Nigricans,
 Hereditary Cerebellar Ataxia, Hereditary Chorea, Hereditary Chronic Progressive Chorea,
 30 Hereditary Connective Tissue Disorders, Hereditary Coproporphyrin, Hereditary
 Coproporphyrin Porphyrin, Hereditary Cutaneous Malignant Melanoma, Hereditary

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Deafness-Retinitis Pigmentosa, Heritable Disorder of Zinc Deficiency, Hereditary DNS, Hereditary Dystopic Lipidosis, Hereditary Emphysema, Hereditary Fructose Intolerance, Hereditary Hemorrhagic Telangiectasia, Hereditary Hemorrhagic Telangiectasia Type I, Hereditary Hemorrhagic Telangiectasia Type II, Hereditary Hemorrhagic Telangiectasia

5 Type III, Hereditary Hyperuricemia and Choreoathetosis Syndrome, Hereditary Leptocytosis Major, Hereditary Leptocytosis Minor, Hereditary Lymphedema, Hereditary Lymphedema Tarda, Hereditary Lymphedema Type I, Hereditary Lymphedema Type II, Hereditary Motor Sensory Neuropathy, Hereditary Motor Sensory Neuropathy I, Hereditary Motor Sensory Neuropathy Type III, Hereditary Nephritis, Hereditary Nephritis

10 and Nerve Deafness, Hereditary Nephropathic Amyloidosis, Hereditary Nephropathy and Deafness, Hereditary Nonpolyposis Colorectal Cancer, Hereditary Nonpolyposis Colorectal Carcinoma, Hereditary Nonspherocytic Hemolytic Anemia, Hereditary Onychoosteodysplasia, Hereditary Optic Neuroretinopathy, Hereditary Polyposis Coli, Hereditary Sensory and Autonomic Neuropathy Type I, Hereditary Sensory and

15 Autonomic Neuropathy Type II, Hereditary Sensory and Autonomic Neuropathy Type III, Hereditary Sensory Motor Neuropathy, Hereditary Sensory Neuropathy type I, Hereditary Sensory Neuropathy Type I, Hereditary Sensory Neuropathy Type II, Hereditary Sensory Neuropathy Type III, Hereditary Sensory Radicular Neuropathy Type I, Hereditary Sensory Radicular Neuropathy Type I, Hereditary Sensory Radicular Neuropathy Type II,

20 Hereditary Site Specific Cancer, Hereditary Spherocytic Hemolytic Anemia, Hereditary Spherocytosis, Hereditary Tyrosinemia Type 1, Heritable Connective Tissue Disorders, Herlitz Syndrome, Hermans-Herzberg Phakomatosis, Hermansky-Pudlak Syndrome, Hermaphroditism, Herpes Zoster, Herpes Iris Stevens-Johnson Type, Hers Disease, Heterozygous Beta Thalassemia, Hexoaminidase Alpha-Subunit Deficiency (Variant B),

25 Hexoaminidase Alpha-Subunit Deficiency (Variant B), HFA, HFM, HGPS, HH, HHHO, HHRH, HHT, Hiatal Hernia-Microcephaly-Nephrosis Galloway Type, Hidradenitis Suppurativa, Hidrosadenitis Axillaris, Hidrosadenitis Suppurativa, Hidrotic Ectodermal Dysplasias, HIE Syndrome, High Imperforate Anus, High Potassium, High Scapula, HIM, Hirschsprung's Disease, Hirschsprung's Disease Acquired, Hirschsprung Disease

30 Polydactyly of Ulnar & Big Toe and VSD, Hirschsprung Disease with Type D Brachydactyly, Hirsutism, HIS Deficiency, Histidine Ammonia-Lyase (HAL) Deficiency,

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Histidase Deficiency, Histidinemia, Histiocytosis, Histiocytosis X, HLHS, HLP Type II, HMG, HMI, HMSN I, HNHA, HOCM, Hodgkin Disease, Hodgkin's Disease, Hodgkin's Lymphoma, Hollaender-Simons Disease, Holmes-Adie Syndrome, Holocarboxylase Synthetase Deficiency, Holoprosencephaly, Holoprosencephaly Malformation Complex, 5 Holoprosencephaly Sequence, Holt-Oram Syndrome, Holt-Oram Type Heart-Hand Syndrome, Homocystinemia, Homocystinuria, Homogentisic Acid Oxidase Deficiency, Homogentisic Aciduria, Homozygous Alpha-1-Antitrypsin Deficiency, HOOD, Horner Syndrome, Horton's disease, HOS, HOS1, Houston-Harris Type Achondrogenesis (Type IA), HPS, HRS, HS, HSAN Type I, HSAN Type II, HSAN-III, HSMN, HSMN Type III, 10 HSN I, HSN-III, Huebner-Herter Disease, Hunner's Patch, Hunner's Ulcer, Hunter Syndrome, Hunter-Thompson Type Acromesomelic Dysplasia, Huntington's Chorea, Huntington's Disease, Hurler Disease, Hurler Syndrome, Hurler-Scheie Syndrome, HUS, Hutchinson-Gilford Progeria Syndrome, Hutchinson-Gilford Syndrome, Hutchinson-Weber-Peutz Syndrome, Hutterite Syndrome Bowen-Conradi Type, Hyaline 15 Panneuropathy, Hydranencephaly, Hydrocephalus, Hydrocephalus Agyria and Retinal Dysplasia, Hydrocephalus Internal Dandy-Walker Type, Hydrocephalus Noncommunicating Dandy-Walker Type, Hydrocephaly, Hydronephrosis With Peculiar Facial Expression, Hydroxylase Deficiency, Hygroma Colli, Hyper-IgE Syndrome, Hyper-IgM Syndrome, Hyperaldosteronism, Hyperaldosteronism With Hypokalemic Alkalosis, 20 Hyperaldosteronism Without Hypertension, Hyperammonemia, Hyperammonemia Due to Carbamylphosphate Synthetase Deficiency, Hyperammonemia Due to Ornithine Transcarbamylase Deficiency, Hyperammonemia Type II, Hyper-Beta Carnosinemia, Hyperbilirubinemia I, Hyperbilirubinemia II, Hypercalcemia Familial with Nephrocalcinosis and Indicanuria, Hypercalcemia-Supravalvar Aortic Stenosis, 25 Hypercalciuric Rickets, Hypercapnic acidosis, Hypercatabolic Protein-Losing Enteropathy, Hyperchloremic acidosis, Hypercholesterolemia, Hypercholesterolemia Type IV, Hyperchylomicronemia, Hypercystinuria, Hyperekplexia, Hyperextensible joints, Hyperglobulinemic Purpura, Hyperglycinemia with Ketoacidosis and Lactic Acidosis Propionic Type, Hyperglycinemia Nonketotic, Hypergonadotropic Hypogonadism, 30 Hyperimmunoglobulin E Syndrome, Hyperimmunoglobulin E-Recurrent Infection Syndrome, Hyperimmunoglobulinemia E-Staphylococcal, Hyperkalemia, Hyperkinetic

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Syndrome, Hyperlipemic Retinitis, Hyperlipidemia I, Hyperlipidemia IV, Hyperlipoproteinemia Type I, Hyperlipoproteinemia Type III, Hyperlipoproteinemia Type IV, Hyperoxaluria, Hyperphalangy-Clinodactyly of Index Finger with Pierre Robin Syndrome, Hyperphenylalanemia, Hyperplastic Epidermolysis Bullosa, Hyperpnea, 5 Hyperpotassemia, Hyperprebeta-Lipoproteinemia, Hyperprolinemia Type I, Hyperprolinemia Type II, Hypersplenism, Hypertelorism with Esophageal Abnormalities and Hypospadias, Hypertelorism-Hypospadias Syndrome, Hypertrophic Cardio myopathy, Hypertrophic Interstitial Neuropathy, Hypertrophic Interstitial Neuritis, Hypertrophic Interstitial Radiculoneuropathy, Hypertrophic Neuropathy of Refsum, Hypertrophic 10 Obstructive Cardio myopathy, Hyperuricemia Choreoathetosis Self-mutilation Syndrome, Hyperuricemia-Oligophrenia, Hypervalinemia, Hypocalcified (Hypomineralized) Type, Hypochondrogenesis, Hypochondroplasia, Hypogammaglobulinemia, Hypogammaglobulinemia Transient of Infancy, Hypogenital Dystrophy with Diabetic Tendency, Hypoglossia-Hypodactylia Syndrome, Hypoglycemia, Exogenous 15 Hypoglycemia, Hypoglycemia with Macroglossia, Hypoglycosylation Syndrome Type 1a, Hypoglycosylation Syndrome Type 1a, Hypogonadism with Anosmia, Hypogonadotropic Hypogonadism and Anosmia, Hypohidrotic Ectodermal Dysplasia, Hypohidrotic Ectodermal Dysplasia Autosomal Dominant type, Hypohidrotic Ectodermal Dysplasias Autorecessive, Hypokalemia, Hypokalemic Alkalosis with Hypercalciuria, Hypokalemic 20 Syndrome, Hypolactasia, Hypomaturation Type (Snow-Capped Teeth), Hypomelanosis of Ito, Hypomelia-Hypotrichosis-Facial Hemangioma Syndrome, Hypomyelination Neuropathy, Hypoparathyroidism, Hypophosphatasia, Hypophosphatemic Rickets with Hypercalcemia, Hypopigmentation, Hypopigmented macular lesion, Hypoplasia of the Depressor Anguli Oris Muscle with Cardiac Defects, Hypoplastic Anemia, Hypoplastic 25 Congenital Anemia, Hypoplastic Chondrodystrophy, Hypoplastic Enamel-Onycholysis-Hypohidrosis, Hypoplastic (Hypoplastic-Explastic) Type, Hypoplastic Left Heart Syndrome, Hypoplastic-Triphalangeal Thumbs, Hypopotassemia Syndrome, Hypospadias-Dysphagia Syndrome, Hyposmia, Hypothalamic Hamartoblastoma Hypopituitarism Imperforate Anus Polydactyly, Hypothalamic Infantilism-Obesity, Hypothyroidism, 30 Hypotonia-Hypomentia-Hypogonadism-Obesity Syndrome, Hypoxanthine-Guanine Phosphoribosyltransferase Defect (Complete Absence of), I-Cell Disease, Iatrogenic

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Hypoglycemia, IBGC, IBIDS Syndrome, IBM, IBS, IC, I-Cell Disease, ICD, ICE Syndrome Cogan-Reese Type, Icelandic Type Amyloidosis (Type VI), I-Cell Disease, Ichthyosiform Erythroderma Corneal Involvement and Deafness, Ichthyosiform Erythroderma Hair Abnormality Growth and Men, Ichthyosiform Erythroderma with
5 Leukocyte Vacuolation, Ichthyosis, Ichthyosis Congenita, Ichthyosis Congenital with Trichothiodystrophy, Ichthyosis Hystrix, Ichthyosis Hystrix Gravior, Ichthyosis Linearis Circumflexa, Ichthyosis Simplex, Ichthyosis Tay Syndrome, Ichthyosis Vulgaris, Ichthyotic Neutral Lipid Storage Disease, Icteric Leptospirosis, Icterohemorrhagic Leptospirosis, Icterus (Chronic Familial), Icterus Gravis Neonatorum, Icterus Intermittens
10 Juvenalis, Idiopathic Alveolar Hypoventilation, Idiopathic Amyloidosis, Idiopathic Arteritis of Takayasu, Idiopathic Basal Ganglia Calcification (IBGC), Idiopathic Brachial Plexus Neuropathy, Idiopathic Cervical Dystonia, Idiopathic Dilatation of the Pulmonary Artery, Idiopathic Facial Palsy, Idiopathic Familial Hyperlipemia, Idiopathic Hypertrophic Subaortic Stenosis, Idiopathic Hypoproteinemia, Idiopathic Immunoglobulin Deficiency,
15 Idiopathic Neonatal Hepatitis, Idiopathic Non-Specific Ulcerative Colitis, Idiopathic Peripheral Periphlebitis, Idiopathic Pulmonary Fibrosis, Idiopathic Refractory Sideroblastic Anemia, Idiopathic Renal Hematuria, Idiopathic Steatorrhea, Idiopathic Thrombocythemia, Idiopathic Thrombocytopenic Purpura, Idiopathic Thrombocytopenia Purpura (ITP), IDPA, IgA Nephropathy, IHSS, Ileitis, Ileocolitis, Illinois Type
20 Amyloidosis, ILS, IM, IMD2, IMD5, Immune Defect due to Absence of Thymus, Immune Hemolytic Anemia Paroxysmal Cold, Immunodeficiency with Ataxia Telangiectasia, Immunodeficiency Cellular with Abnormal Immunoglobulin Synthesis, Immunodeficiency Common Variable Unclassifiable, Immunodeficiency with Hyper-IgM, Immunodeficiency with Leukopenia, Immunodeficiency-2, Immunodeficiency-5 (IMD5), Immunoglobulin
25 Deficiency, Imperforate Anus, Imperforate Anus with Hand Foot and Ear Anomalies, Imperforate Nasolacrimal Duct and Premature Aging Syndrome, Impotent Neutrophil Syndrome, Inability To Open Mouth Completely And Short Finger-Flexor, INAD, Inborn Error of Urea Synthesis Arginase Type, Inborn Error of Urea Synthesis Arginino Succinic Type, Inborn Errors of Urea Synthesis Carbamyl Phosphate Type, Inborn Error of Urea
30 Synthesis Citrullinemia Type, Inborn Errors of Urea Synthesis Glutamate Synthetase Type, INCL, Inclusion body myositis, Incomplete Atrioventricular Septal Defect, Incomplete

Testicular Feminization, Incontinentia Pigmenti, Incontinentia Pigmenti Achromians, Index
Finger Anomaly with Pierre Robin Syndrome, Indiana Type Amyloidosis (Type II),
Indolent systemic mastocytosis, Infantile Acquired Aphasia, Infantile Autosomal
Recessive Polycystic Kidney Disease, Infantile Beriberi, Infantile Cerebral Ganglioside,
5 Infantile Cerebral Paralysis, Infantile Cystinosis, Infantile Epileptic, Infantile Fanconi
Syndrome with Cystinosis, Infantile Finnish Type Neuronal Ceroid Lipofuscinosis,
Infantile Gaucher Disease, Infantile Hypoglycemia, Infantile Hypophosphatasia, Infantile
Lobar Emphysema, Infantile Myoclonic Encephalopathy, Infantile Myoclonic
Encephalopathy and Polymyoclonia, Infantile Myofibromatosis, Infantile Necrotizing
10 Encephalopathy, Infantile Neuronal Ceroid Lipofuscinosis, Infantile Neuroaxonal
Dystrophy, Infantile Onset Schindler Disease, Infantile Phytanic Acid Storage Disease,
Infantile Refsum Disease (IRD), Infantile Sipoidosis GM-2 Gangliosidosis (Type S),
Infantile Sleep Apnea, Infantile Spasms, Infantile Spinal Muscular Atrophy (all types),
Infantile Spinal Muscular Atrophy ALS, Infantile Spinal Muscular Atrophy Type I,
15 Infantile Type Neuronal Ceroid Lipofuscinosis, Infectious Jaundice, Inflammatory Breast
Cancer, Inflammatory Linear Nevus Sebaceous Syndrome, Iniencephaly, Insulin Resistant
Acanthosis Nigricans, Insulin Lipodystrophy, Insulin dependent Diabetes, Intention
Myoclonus, Intermediate Cystinosis, Intermediate Maple Syrup Urine Disease, Intermittent
Ataxia with Pyruvate Dehydrogenase Deficiency, Intermittent Maple Syrup Urine Disease,
20 Internal Hydrocephalus, Interstitial Cystitis, Interstitial Deletion of 4q Included, Intestinal
Lipodystrophy, Intestinal Lipophagic Granulomatosis, Intestinal Lymphangiectasia,
Intestinal Polyposis I, Intestinal Polyposis II, Intestinal Polyposis III, Intestinal Polyposis-
Cutaneous Pigmentation Syndrome, Intestinal Pseudoobstruction with External
Ophthalmoplegia, Intracranial Neoplasm, Intracranial Tumors, Intracranial Vascular
25 Malformations, Intrauterine Dwarfism, Intrauterine Synechiae, Inverted Smile And Occult
Neuropathic Bladder, Iowa Type Amyloidosis (Type IV), IP, IPA, Iridocorneal Endothelial
Syndrome, Iridocorneal Endothelial (ICE) Syndrome Cogan-Resse Type,
Iridogoniodysgenesis With Somatic Anomalies, Iris Atrophy with Corneal Edema and
Glaucoma, Iris Nevus Syndrome, Iron Overload Anemia, Iron Overload Disease, Irritable
30 Bowel Syndrome, Irritable Colon Syndrome, Isaacs Syndrome, Isaacs-Merten Syndrome,
Ischemic Cardio myopathy, Isolated Lissencephaly Sequence, Isoleucine 33 Amyloidosis,

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Isovaleric Acid CoA Dehydrogenase Deficiency, Isovaleric Acidaemia,
 Isovalericacidemia, Isovaleryl CoA Carboxylase Deficiency, ITO Hypomelanosis, ITO,
 ITP, IVA, Ivemark Syndrome, Iwanoff Cysts, Jackknife Convulsion, Jackson-Weiss
 Craniosynostosis, Jackson-Weiss Syndrome, Jacksonian Epilepsy, Jacobsen Syndrome,
 5 Jadassohn-Lewandowsky Syndrome, Jaffe-Lichenstein Disease, Jakob's Disease, Jakob-
 Creutzfeldt Disease, Janeway I, Janeway Dysgammaglobulinemia, Jansen Metaphyseal
 Dysostosis, Jansen Type Metaphyseal Chondrodysplasia, Jarcho-Levin Syndrome, Jaw-
 Winking, JBS, JDMS, Jegher's Syndrome, Jejunal Atresia, Jejunitis, Jejunoileitis, Jervell
 and Lange-Nielsen Syndrome, Jeune Syndrome, JMS, Job Syndrome, Job-Buckley
 10 Syndrome, Johanson-Blizzard Syndrome, John Dalton, Johnson-Stevens Disease,
 Jonston's Alopecia, Joseph's Disease, Joseph's Disease Type I, Joseph's Disease Type II,
 Joseph's Disease Type III, Joubert Syndrome, Joubert-Bolthausen Syndrome, JRA, Juberg
 Hayward Syndrome, Juberg-Marsidi Syndrome, Juberg-Marsidi Mental Retardation
 Syndrome, Jumping Frenchmen, Jumping Frenchmen of Maine, Juvenile Arthritis,
 15 Juvenile Autosomal Recessive Polycystic Kidney Disease, Juvenile Cystinosis, Juvenile
 (Childhood) Dermatomyositis (JDMS), Juvenile Diabetes, Juvenile Gaucher Disease,
 Juvenile Gout Choreoathetosis and Mental Retardation Syndrome, Juvenile Intestinal
 Malabsorption of Vit B12, Juvenile Intestinal Malabsorption of Vitamin B12, Juvenile
 Macular Degeneration, Juvenile Pernicious Anemia, Juvenile Retinoschisis, Juvenile
 20 Rheumatoid Arthritis, Juvenile Spinal Muscular Atrophy Included, Juvenile Spinal
 Muscular Atrophy ALS Included, Juvenile Spinal Muscular Atrophy Type III, Juxta-
 Articular Adiposis Dolorosa, Juxtaglomerular Hyperplasia, Kabuki Make-Up Syndrome,
 Kahler Disease, Kallmann Syndrome, Kanner Syndrome, Kanzaki Disease, Kaposi Disease
 (not Kaposi Sarcoma), Kappa Light Chain Deficiency, Karsch-Neugebauer Syndrome,
 25 Kartagener Syndrome-Chronic Sinobronchial Disease and Dextrocardia, Kartagener Triad,
 Kasabach-Merritt Syndrome, Kast Syndrome, Kawasaki Disease, Kawasaki Syndrome,
 KBG Syndrome, KD, Kearns-Sayre Disease, Kearns-Sayre Syndrome, Kennedy Disease,
 Kennedy Syndrome, Kennedy Type Spinal and Bulbar Muscular Atrophy, Kennedy-
 Stefanis Disease, Kenny Disease, Kenny Syndrome, Kenny Type Tubular Stenosis,
 30 Kenny-Caffe Syndrome, Kera. Palmoplant. Con. Pes Planus Ony. Periodon. Arach.,
 Keratitis Ichthyosis Deafness Syndrome, Keratoconus, Keratoconus Posticus

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Circumscriptus, Keratolysis, Keratolysis Exfoliativa Congenita, Keratolytic Winter Erythema, Keratomalacia, Keratosis Follicularis, Keratosis Follicularis Spinulosa Decalvans, Keratosis Follicularis Spinulosa Decalvans Ichthyosis, Keratosis Nigricans, Keratosis Palmoplantaris with Periodontopathia and Onychogryposis, Keratosis

5 Palmoplantaris Congenital Pes Planus Onychogryposis Periodontosis Arachnodactyly, Keratosis Palmoplantaris Congenital, Pes Planus, Onychogryphosis, Periodontosis, Arachnodactyly, Acroosteolysis, Keratosis Rubra Figurata, Keratosis Seborrheica, Ketoacid Decarboxylase Deficiency, Ketoaciduria, Ketotic Glycinemia, KFS, KID Syndrome, Kidney Agenesis, Kidneys Cystic-Retinal Aplasia Joubert Syndrome, Killian

10 Syndrome, Killian/Teschler-Nicola Syndrome, Kiloh-Nevin syndrome III, Kinky Hair Disease, Kinsbourne Syndrome, Kleeblattschadel Deformity, Kleine-Levin Syndrome, Kleine-Levin Hibernation Syndrome, Klinefelter, Klippel-Feil Syndrome, Klippel-Feil Syndrome Type I, Klippel-Feil Syndrome Type II, Klippel-Feil Syndrome Type III, Klippel Trenaunay Syndrome, Klippel-Trenaunay-Weber Syndrome, Kluver-Bucy

15 Syndrome, KMS, Kniest Dysplasia, Kniest Syndrome, Kobner's Disease, Koebberling-Dunnigan Syndrome, Kohlmeier-Degos Disease, Kok Disease, Korsakoff Psychosis, Korsakoff's Syndrome, Krabbe's Disease Included, Krabbe's Leukodystrophy, Kramer Syndrome, KSS, KTS, KTW Syndrome, Kufs Disease, Kugelberg-Welander Disease, Kugelberg-Welander Syndrome, Kussmaul-Landry Paralysis, KWS, L-3-Hydroxy-Acyl-

20 CoA Dehydrogenase (LCHAD) Deficiency, Laband Syndrome, Labhart-Willi Syndrome, Labyrinthine Syndrome, Labyrinthine Hydrops, Lacrimo-Auriculo-Dento-Digital Syndrome, Lactase Isolated Intolerance, Lactase Deficiency, Lactation-Uterus Atrophy, Lactic Acidosis Leber Hereditary Optic Neuropathy, Lactic and Pyruvate Acidemia with Carbohydrate Sensitivity, Lactic and Pyruvate Acidemia with Episodic Ataxia and

25 Weakness, Lactic and Pyruvate, Lactic acidosis, Lactose Intolerance of Adulthood, Lactose Intolerance, Lactose Intolerance of Childhood, LADD Syndrome, LADD, Lafora Disease Included, Lafora Body Disease, Laki-Lorand Factor Deficiency, LAM, Lambert Type Ichthyosis, Lambert-Eaton Syndrome, Lambert-Eaton Myasthenic Syndrome, Lamellar Recessive Ichthyosis, Lamellar Ichthyosis, Lancereaux-Mathieu-Weil

30 Spirochetosis, Landau-Kleffner Syndrome, Landouzy Dejerine Muscular Dystrophy, Landry Ascending Paralysis, Langer-Salidino Type Achondrogensis (Type II), Langer

Giedion Syndrome, Langerhans-Cell Granulomatosis, Langerhans-Cell Histiocytosis (LCH), Large Atrial and Ventricular Defect, Laron Dwarfism, Laron Type Pituitary Dwarfism, Larsen Syndrome, Laryngeal Dystonia, Latah (Observed in Malaysia), Late Infantile Neuroaxonal Dystrophy, Late Infantile Neuroaxonal Dystrophy, Late Onset

5 Cockayne Syndrome Type III (Type C), Late-Onset Dystonia, Late-Onset Immunoglobulin Deficiency, Late Onset Pelizaeus-Merzbacher Brain Sclerosis, Lattice Corneal Dystrophy, Lattice Dystrophy, Launois-Bensaude, Launois-Cleret Syndrome, Laurence Syndrome, Laurence-Moon Syndrome, Laurence-Moon/Bardet-Biedl, Lawrence-Seip Syndrome, LCA, LCAD Deficiency, LCAD, LCAD, LCADH Deficiency, LCH, LCHAD, LCPD, Le

10 Jeune Syndrome, Leband Syndrome, Leber's Amaurosis, Leber's Congenital Amaurosis, Congenital Absence of the Rods and Cones, Leber's Congenital Tapetoretinal Degeneration, Leber's Congenital Tapetoretinal Dysplasia, Leber's Disease, Leber's Optic Atrophy, Leber's Optic Neuropathy, Left Ventricular Fibrosis, Leg Ulcer, Legg-Calve-Perthes Disease, Leigh's Disease, Leigh's Syndrome, Leigh's Syndrome (Subacute

15 Necrotizing Encephalomyelopathy), Leigh Necrotizing Encephalopathy, Lennox-Gastaut Syndrome, Lentigio-Polypose-Digestive Syndrome, Lenz Dysmorphogenetic Syndrome, Lenz Dysplasia, Lenz Microphthalmia Syndrome, Lenz Syndrome, LEOPARD Syndrome, Leprechaunism, Leptomeningeal Angiomatosis, Leptospiral Jaundice, Leri-Weill Disease, Leri-Weil Dyschondrosteosis, Leri-Weil Syndrome, Lermoyez Syndrome, Leroy Disease,

20 Lesch Nyhan Syndrome, Lethal Infantile Cardio myopathy, Lethal Neonatal Dwarfism, Lethal Osteochondrodysplasia, Letterer-Siwe Disease, Leukocytic Anomaly Albinism, Leukocytic Inclusions with Platelet Abnormality, Leukodystrophy, Leukodystrophy with Rosenthal Fibers, Leukoencephalitis Periaxialis Concentric, Levine-Critchley Syndrome, Levulosemia, Levy-Hollister Syndrome, LGMD, LGS, LHON, LIC, Lichen Ruber

25 Acuminatus, Lichen Acuminatus, Lichen Amyloidosis, Lichen Planus, Lichen Psoriasis, Lignac-Debre-Fanconi Syndrome, Lignac-Fanconi Syndrome, Ligneous Conjunctivitis, Limb-Girdle Muscular Dystrophy, Limb Malformations-Dento-Digital Syndrome, Limit Dextrinosis, Linear Nevoid Hypermelanosis, Linear Nevus Sebaceous Syndrome, Linear Scleroderma, Linear Sebaceous Nevus Sequence, Linear Sebaceous Nevus Syndrome,

30 Lingua Fissurata, Lingua Plicata, Lingua Scrotalis, Linguofacial Dyskinesia, Lip Pseudocleft-hemangiomatic Branchial Cyst Syndrome, Lipid Granulomatosis, Lipid

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Histiocytosis, Lipid Keratin Type, Lipid Storage Disease, Lipid-Storage myopathy Associated with SCAD Deficiency, Lipidosis Ganglioside Infantile, Lipoatrophic Diabetes Mellitus, Lipodystrophy, Lipoid Corneal Dystrophy, Lipoid Hyperplasia-Male Pseudohermaphroditism, Lipomatosis of Pancreas Congenital, Lipomucopolysaccharidosis

5 Type I, Lipomyelomeningocele, Lipoprotein Lipase Deficiency Familial, LIS, LIS1, Lissencephaly 1, Lissencephaly Type I, Lissencephaly variants with agenesis of the corpus callosum cerebellar hypoplasia or other anomalies, Little Disease, Liver Phosphorylase Deficiency, LKS, LM Syndrome, Lobar Atrophy, Lobar Atrophy of the Brain, Lobar Holoprosencephaly, Lobar Tension Emphysema in Infancy, Lobstein Disease (Type I),

10 Lobster Claw Deformity, Localized Epidermolysis Bullosa, Localized Lipodystrophy, Localized Neuritis of the Shoulder Girdle, Loeffler's Disease, Loeffler Endomyocardial Fibrosis with Eosinophilia, Loeffler Fibroplastic Parietal Endocarditis, Loken Syndrome, Loken-Senior Syndrome, Long-Chain 3-hydroxyacyl-CoA Dehydrogenase (LCHAD), Long Chain Acyl CoA Dehydrogenase Deficiency, Long-Chain Acyl-CoA Dehydrogenase

15 (ACADL), Long-Chain Acyl-CoA Dehydrogenase Deficiency, Long QT Syndrome without Deafness, Lou Gehrig's Disease, Lou Gehrig's Disease Included, Louis-Bar Syndrome, Low Blood Sugar, Low-Density Beta Lipoprotein Deficiency, Low Imperforate Anus, Low Potassium Syndrome, Lowe syndrome, Lowe's Syndrome, Lowe-Bickel Syndrome, Lowe-Terry-MacLachlan Syndrome, LS, LTD, Lubs Syndrome, Luft Disease,

20 Lumbar Canal Stenosis, Lumbar Spinal Stenosis, Lumbosacral Spinal Stenosis, Lundborg-Unverricht Disease, Lundborg-Unverricht Disease Included, Lupus, Lupus, Lupus Erythematosus, Luschka-Magendie Foramina Atresia, Lyell Syndrome, Lyelles Syndrome, Lymphadenoid Goiter, Lymphangiectatic Protein-Losing Enteropathy, Lymphangioma, Lymphangioma, Lymphatic

25 Malformations, Lynch Syndromes, Lynch Syndrome I, Lynch Syndrome II, Lysosomal Alpha-N-Acetylgalactosaminidase Deficiency Schindler Type, Lysosomal Glycoaminoacid Storage Disease-Angiokeratoma Corporis Diffusum, Lysosomal Glucosidase Deficiency, MAA, Machado Disease, Machado-Joseph Disease, Macrencephaly, Macrocephaly, Macrocephaly Hemihypertrophy, Macrocephaly with

30 Multiple Lipomas and Hemangiomas, Macrocephaly with Pseudopapilledema and Multiple Hemangiomas, Macroglobulinemia, Macroglossia, Macroglossia-Omphalocele-

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Visceromegaly Syndrome, Macrostomia Ablepheron Syndrome, Macrothrombocytopenia
 Familial Bernard-Soulier Type, Macula Lutea degeneration, Macular Amyloidosis,
 Macular Degeneration, Macular Degeneration Disciform, Macular Degeneration Senile,
 Macular Dystrophy, Macular Type Corneal Dystrophy, MAD, Madelung's Disease,
 5 Maffucci Syndrome, Major Epilepsy, Malabsorption, Malabsorption-Ectodermal
 Dysplasia-Nasal Alar Hypoplasia, Maladie de Roger, Maladie de Tics, Male Malformation
 of Limbs and Kidneys, Male Turner Syndrome, Malignant Acanthosis, Malignant
 Acanthosis Nigricans, Malignant Astrocytoma, Malignant Atrophic Papulosis, Malignant
 Fever, Malignant Hyperphenylalaninemia, Malignant Hyperpyrexia, Malignant
 10 Hyperthermia, Malignant Melanoma, Malignant Tumors of the Central Nervous System,
 Mallory-Weiss Laceration, Mallory-Weiss Tear, Mallory-Weiss Syndrome, Mammary
 Paget's Disease, Mandibular Ameloblastoma, Mandibulofacial Dysostosis, Mannosidosis,
 Map-Dot-Fingerprint Type Corneal Dystrophy, Maple Syrup Urine Disease, Marble
 Bones, Marchiafava-Micheli Syndrome, Marcus Gunn Jaw-Winking Syndrome, Marcus
 15 Gunn Phenomenon, Marcus Gunn Ptosis with jaw-winking, Marcus Gunn Syndrome,
 Marcus Gunn (Jaw-Winking) Syndrome, Marcus Gunn Ptosis (with jaw-winking),
 Marden-Walker Syndrome, Marden-Walker Type Connective Tissue Disorder, Marfan's
 Abiotrophy, Marfan-Achard syndrome, Marfan Syndrome, Marfan's Syndrome I,
 Marfan's Variant, Marfanoid Hypermobility Syndrome, Marginal Corneal Dystrophy,
 20 Marie's Ataxia, Marie Disease, Marie-Sainton Disease, Marie Strumpell Disease, Marie-
 Strumpell Spondylitis, Marinesco-Sjogren Syndrome, Marinesco-Sjogren-Gorland
 Syndrome, Marker X Syndrome, Maroteaux Lamy Syndrome, Maroteaux Type
 Acromesomelic Dysplasia, Marshall's Ectodermal Dysplasias With Ocular and Hearing
 Defects, Marshall-Smith Syndrome, Marshall Syndrome, Marshall Type Deafness-
 25 Myopia-Cataract-Saddle Nose, Martin-Albright Syndrome, Martin-Bell Syndrome,
 Martorell Syndrome, MASA Syndrome, Massive Myoclonia, Mast Cell Leukemia,
 Mastocytosis, Mastocytosis With an Associated Hematologic Disorder, Maumenee
 Corneal Dystrophy, Maxillary Ameloblastoma, Maxillofacial Dysostosis, Maxillonasal
 Dysplasia, Maxillonasal Dysplasia Binder Type, Maxillopalpebral Synkinesis, May-
 30 Hegglin Anomaly, MCAD Deficiency, MCAD, McArdle Disease, McCune-Albright,
 MCD, McKusick Type Metaphyseal Chondrodysplasia, MCR, MCTD, Meckel Syndrome,

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Meckel-Gruber Syndrome, Median Cleft Face Syndrome, Mediterranean Anemia, Medium-Chain Acyl-CoA dehydrogenase (ACADM), Medium Chain Acyl-CoA Dehydrogenase (MCAD) Deficiency, Medium-Chain Acyl-CoA Dehydrogenase Deficiency, Medullary Cystic Disease, Medullary Sponge Kidney, MEF, Megaesophagus, 5 Megalencephaly, Megalencephaly with Hyaline Inclusion, Megalencephaly with Hyaline Panneuropathy, Megaloblastic Anemia, Megaloblastic Anemia of Pregnancy, Megalocornea-Mental Retardation Syndrome, Meier-Gorlin Syndrome, Meige's Lymphedema, Meige's Syndrome, Melanodermic Leukodystrophy, Melanoplakia-Intestinal Polyposis, Melanoplakia-Intestinal Polyposis, MELAS Syndrome, MELAS, 10 Melkersson Syndrome, Melnick-Fraser Syndrome, Melnick-Needles Osteodysplasty, Melnick-Needles Syndrome, Membranous Lipodystrophy, Mendes Da Costa Syndrome, Meniere Disease, Ménière's Disease, Meningeal Capillary Angiomatosis, Menkes Disease, Menke's Syndrome I, Mental Retardation Aphasia Shuffling Gait Adducted Thumbs (MASA), Mental Retardation-Deafness-Skeletal Abnormalities-Coarse Face with Full 15 Lips, Mental Retardation with Hypoplastic 5th Fingernails and Toenails, Mental Retardation with Osteocartilaginous Abnormalities, Mental Retardation-X-linked with Growth Delay-Deafness-Microgenitalism, Menzel Type OPCA, Mermaid Syndrome, MERRF, MERRF Syndrome, Merten-Singleton Syndrome, MES, Mesangial IGA Nephropathy, Mesenteric Lipodystrophy, Mesiodens-Cataract Syndrome, Mesodermal 20 Dysmorphodystrophy, Mesomelic Dwarfism-Madelung Deformity, Metabolic Acidosis, Metachromatic Leukodystrophy, Metatarsus Varus, Metatropic Dwarfism Syndrome, Metatropic Dysplasia, Metatropic Dysplasia I, Metatropic Dysplasia II, Methylmalonic Acidemia, Methylmalonic Aciduria, Meulengracht's Disease, MFD1, MG, MH, MHA, Micrencephaly, Microcephalic Primordial Dwarfism I, Microcephaly, Microcephaly-Hiatal 25 Hernia-Nephrosis Galloway Type, Microcephaly-Hiatal Hernia-Nephrotic Syndrome, Microcystic Corneal Dystrophy, Microcythemia, Microlissencephaly, Microphthalmia, Microphthalmia or Anophthalmos with Associated Anomalies, Micropolygyria With Muscular Dystrophy, Microtia Absent Patellae Micrognathia Syndrome, Microvillus Inclusion Disease, MID, Midsystolic-click-late systolic murmur syndrome, Miescher's 30 Type I Syndrome, Mikulicz Syndrome, Mikulicz-Radecki Syndrome, Mikulicz-Sjogren Syndrome, Mild Autosomal Recessive, Mild Intermediate Maple Syrup Urine Disease,

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Mild Maple Syrup Urine Disease, Miller Syndrome, Miller-Dieker Syndrome, Miller-Fisher Syndrome, Milroy Disease, Minkowski-Chauffard Syndrome, Minor Epilepsy, Minot-Von Willebrand Disease, Mirror-Image Dextrocardia, Mitochondrial Beta-Oxidation Disorders, Mitochondrial and Cytosolic, Mitochondrial Cytopathy, Mitochondrial Cytopathy, Kearn-Sayre Type, Mitochondrial Encephalopathy, Mitochondrial Encephalomyopathy Lactic Acidosis and Strokelike Episodes, Mitochondrial myopathy, Mitochondrial myopathy Encephalopathy Lactic Acidosis Stroke-Like Episode, Mitochondrial PEPCK Deficiency, Mitral-valve prolapse, Mixed Apnea, Mixed Connective Tissue Disease, Mixed Hepatic Porphyria, Mixed Non-Fluent Aphasia, Mixed Sleep Apnea, Mixed Tonic and Clonic Torticollis, MJD, MKS, ML I, ML II, ML III, ML IV, ML Disorder Type I, ML Disorder Type II, ML Disorder Type III, ML Disorder Type IV, MLNS, MMR Syndrome, MND, MNGIE, MNS, Mobitz I, Mobitz II, Mobius Syndrome, Moebius Syndrome, Moersch-Woltmann Syndrome, Mohr Syndrome, Monilethrix, Monomodal Visual Amnesia, Mononeuritis Multiplex, Mononeuritis Peripheral, Mononeuropathy Peripheral, Monosomy 3p2, Monosomy 9p Partial, Monosomy 11q Partial, Monosomy 13q Partial, Monosomy 18q Syndrome, Monosomy X, Monostotic Fibrous Dysplasia, Morgagni-Turner-Albright Syndrome, Morphea, Morquio Disease, Morquio Syndrome, Morquio Syndrome A, Morquio Syndrome B, Morquio-Brailsford Syndrome, Morvan Disease, Mosaic Tetrasomy 9p, Motor Neuron Disease, Motor Neuron Syndrome, Motor Neurone Disease, Motoneuron Disease, Motoneurone Disease, Motor System Disease (Focal and Slow), Moya-moya Disease, Moyamoya Disease, MPS, MPS I, MPS I H, MPS I H/S Hurler/Scheie Syndrome, MPS I S Scheie Syndrome, MPS II, MPS IIA, MPS IIB, MPS II-AR Autosomal Recessive Hunter Syndrome, MPS II-XR, MPS II-XR Severe Autosomal Recessive, MPS III, MPS III A B C and D Sanfilippo A, MPS IV, MPS IV A and B Morquio A, MPS V, MPS VI, MPS VI Severe Intermediate Mild Maroteaux-Lamy, MPS VII, MPS VII Sly Syndrome, MPS VIII, MPS Disorder, MPS Disorder I, MPS Disorder II, MPS Disorder III, MPS Disorder VI, MPS Disorder Type VII, MRS, MS, MSA, MSD, MSL, MSS, MSUD, MSUD, MSUD Type Ib, MSUD Type II, Mucocutaneous Lymph Node Syndrome, Mucopolipidosis I, Mucopolipidosis II, Mucopolipidosis III, Mucopolipidosis IV, Mucopolysaccharidosis, Mucopolysaccharidosis I-H, Mucopolysaccharidosis I-S, Mucopolysaccharidosis II,

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Mucopolysaccharidosis III, Mucopolysaccharidosis IV, Mucopolysaccharidosis VI,
 Mucopolysaccharidosis VII, Mucopolysaccharidosis Type I, Mucopolysaccharidosis Type
 II, Mucopolysaccharidosis Type III, Mucopolysaccharidosis Type VII, Mucosis,
 Mucosulfatidosis, Mucous Colitis, Mucoviscidosis, Mulibrey Dwarfism, Mulibrey Nanism
 5 Syndrome, Mullerian Duct Aplasia-Renal Aplasia-Cervicothoracic Somite Dysplasia,
 Mullerian Duct-Renal-Cervicothoracic-Upper Limb Defects, Mullerian Duct and Renal
 Agenesis with Upper Limb and Rib Anomalies, Mullerian-Renal-Cervicothoracic Somite
 Abnormalities, Multi-Infarct Dementia Binswanger's Type, Multicentric Castleman's
 Disease, Multifocal Eosinophilic Granuloma, Multiple Acyl-CoA Dehydrogenase
 10 Deficiency, Multiple Acyl-CoA Dehydrogenase Deficiency / Glutaric Aciduria Type II,
 Multiple Angiomas and Endochondromas, Multiple Carboxylase Deficiency, Multiple
 Cartilaginous Enchondroses, Multiple Cartilaginous Exostoses, Multiple
 Enchondromatosis, Multiple Endocrine Deficiency Syndrome Type II, Multiple
 Epiphyseal Dysplasia, Multiple Exostoses, Multiple Exostoses Syndrome, Multiple
 15 Familial Polyposis, Multiple Lentigines Syndrome, Multiple Myeloma, Multiple Neuritis
 of the Shoulder Girdle, Multiple Osteochondromatosis, Multiple Peripheral Neuritis,
 Multiple Polyposis of the Colon, Multiple Pterygium Syndrome, Multiple Sclerosis,
 Multiple Sulfatase Deficiency, Multiple Symmetric Lipomatosis, Multiple System
 Atrophy, Multisynostotic Osteodysgenesis, Multisynostotic Osteodysgenesis with Long
 20 Bone Fractures, Mulvihill-Smith Syndrome, MURCS Association, Murk Jansen Type
 Metaphyseal Chondrodysplasia, Muscle Carnitine Deficiency, Muscle Core Disease,
 Muscle Phosphofructokinase Deficiency, Muscular Central Core Disease, Muscular
 Dystrophy, Muscular Dystrophy Classic X-linked Recessive, Muscular Dystrophy
 Congenital With Central Nervous System Involvement, Muscular Dystrophy Congenital
 25 Progressive with Mental Retardation, Muscular Dystrophy Facioscapulohumeral, Muscular
 Rheumatism, Muscular Rigidity - Progressive Spasm, Musculoskeletal Pain Syndrome,
 Mutilating Acropathy, Mutism, mvp, MVP, MWS, Myasthenia Gravis, Myasthenia Gravis
 Pseudoparalytica, Myasthenic Syndrome of Lambert-Eaton, Myelinoclastic Diffuse
 Sclerosis, Myelomatosis, Myhre Syndrome, Myoclonic Astatic Petit Mal Epilepsy,
 30 Myoclonic Dystonia, Myoclonic Encephalopathy of Infants, Myoclonic Epilepsy,
 Myoclonic Epilepsy Hartung Type, Myoclonus Epilepsy Associated with Ragged Red

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Fibers, Myoclonic Epilepsy and Ragged-Red Fiber Disease, Myoclonic Progressive
 Familial Epilepsy, Myoclonic Progressive Familial Epilepsy, Myoclonic Seizure,
 Myoclonus, Myoclonus Epilepsy, Myoencephalopathy Ragged-Red Fiber Disease,
 Myofibromatosis, Myofibromatosis Congenital, Myogenic Facio-Scapulo-Peroneal
 5 Syndrome, Myoneurogastrointestinal Disorder and Encephalopathy, Myopathic
 Arthrogryposis Multiplex Congenita, Myopathic Carnitine Deficiency, Myopathy Central
 Fibrillar, myopathy Congenital Nonprogressive, myopathy Congenital Nonprogressive
 with Central Axis, myopathy with Deficiency of Carnitine Palmitoyltransferase,
 myopathy-Marinesco-Sjogren Syndrome, myopathy-Metabolic Carnitine
 10 Palmitoyltransferase Deficiency, myopathy Mitochondrial-Encephalopathy-Lactic
 Acidosis-Stroke, myopathy with Sarcoplasmic Bodies and Intermediate Filaments,
 Myophosphorylase Deficiency, Myositis Ossificans Progressiva, Myotonia Atrophica,
 Myotonia Congenita, Myotonia Congenita Intermittens, Myotonic Dystrophy, Myotonic
 myopathy Dwarfism Chondrodystrophy Ocular and Facial Anomalies, Myotubular
 15 myopathy, Myotubular myopathy X-linked, Myproic Acid, Myriachit (Observed in
 Siberia), Myxedema, N-Acetylglucosamine-1-Phosphotransferase Deficiency, N-Acetyl
 Glutamate Synthetase Deficiency, NADH-CoQ reductase deficiency, Naegeli Ectodermal
 Dysplasias, Nager Syndrome, Nager Acrofacial Dysostosis Syndrome, Nager Syndrome,
 NAGS Deficiency, Nail Dystrophy-Deafness Syndrome, Nail Dysgenesis and Hypodontia,
 20 Nail-Patella Syndrome, Nance-Horan Syndrome, Nanocephalic Dwarfism, Nanocephaly,
 Nanophthalmia, Narcolepsy, Narcoleptic syndrome, NARP, Nasal-fronto-faciodyplasia,
 Nasal Alar Hypoplasia Hypothyroidism Pancreatic Achylia Congenital Deafness,
 Nasomaxillary Hypoplasia, Nasu Lipodystrophy, NBIA1, ND, NDI, NDP, Necrotizing
 Encephalomyelopathy of Leigh's, Necrotizing Respiratory Granulomatosis, Neill-
 25 Dingwall Syndrome, Nelson Syndrome, Nemaline myopathy, Neonatal
 Adrenoleukodystrophy, Neonatal Adrenoleukodystrophy (NALD), Neonatal
 Adrenoleukodystrophy (ALD), Neonatal Autosomal Recessive Polycystic Kidney Disease,
 Neonatal Dwarfism, Neonatal Hepatitis, Neonatal Hypoglycemia, Neonatal Lactose
 Intolerance, Neonatal Lymphedema due to Exudative Enteropathy, Neonatal Progeroid
 30 Syndrome, Neonatal Pseudo-Hydrocephalic Progeroid Syndrome of Wiedemann-
 Rautenstrauch, Neoplastic Arachnoiditis, Nephroblastoma, Nephrogenic Diabetes Insipidus,

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Nephronophthisis Familial Juvenile, Nephropathic Cystinosis, Nephropathy-
 Pseudohermaphroditism-Wilms Tumor, Nephrosis-Microcephaly Syndrome, Nephrosis-
 Neuronal Dysmigration Syndrome, Nephrotic-Glycosuric-Dwarfism-Rickets-
 Hypophosphatemic Syndrome, Netherton Disease, Netherton Syndrome, Netherton
 5 Syndrome Ichthyosis, Nettleship Falls Syndrome (X-Linked), Neu-Laxova Syndrome,
 Neuhauser Syndrome, Neural-tube defects, Neuralgic Amyotrophy, Neuraminidase
 Deficiency, Neuraocutaneous melanosis, Neurinoma of the Acoustic Nerve, Neurinoma,
 Neuroacanthocytosis, Neuroaxonal Dystrophy Schindler Type, Neurodegeneration with
 brain iron accumulation type 1 (NBIA1), Neurofibroma of the Acoustic Nerve, Neurogenic
 10 Arthrogryposis Multiplex Congenita, Neuromyelitis Optica, Neuromyotonia,
 Neuromyotonia, Focal, Neuromyotonia, Generalized, Familial, Neuromyotonia,
 Generalized, Sporadic, Neuronal Axonal Dystrophy Schindler Type, Neuronal Ceroid
 Lipofuscinosis Adult Type, Neuronal Ceroid Lipofuscinosis Juvenile Type, Neuronal
 Ceroid Lipofuscinosis Type 1, Neuronopathic Acute Gaucher Disease, Neuropathic
 15 Amyloidosis, Neuropathic Beriberi, Neuropathy Ataxia and Retinitis Pigmentosa,
 Neuropathy of Brachialplexus Syndrome, Neuropathy Hereditary Sensory Type I,
 Neuropathy Hereditary Sensory Type II, Neutral Lipid Storage Disease, Nevii, Nevoid
 Basal Cell Carcinoma Syndrome, Nevus, Nevus Cavemosus, Nevus Comedonicus, Nevus
 Depigmentosus, Nevus Sebaceous of Jadassohn, Nezelof's Syndrome, Nezelof's Thymic
 20 Aplasia, Nezelof Type Severe Combined Immunodeficiency, NF, NF1, NF2, NF-1, NF-2,
 NHS, Niemann Pick Disease, Nieman Pick disease Type A (acute neuronopathic form),
 Nieman Pick disease Type B, Nieman Pick Disease Type C (chronic neuronopathic form),
 Nieman Pick disease Type D (Nova Scotia variant), Nieman Pick disease Type E, Nieman
 Pick disease Type F (sea-blue histiocyte disease), Night Blindness, Nigrospinodontatal
 25 Degeneration, Niikawakuroki Syndrome, NLS, NM, Noack Syndrome Type I, Nocturnal
 Myoclonus Hereditary Essential Myoclonus, Nodular Cornea Degeneration, Non-Bullous
 CIE, Non-Bullous Congenital Ichthyosiform Erythroderma, Non-Communicating
 Hydrocephalus, Non-Deletion Type Alpha-Thalassemia / Mental Retardation syndrome,
 Non-Ketonic Hyperglycinemia Type I (NKH1), Non-Ketotic Hyperglycinemia, Non-Lipid
 30 Reticuloendotheliosis, Non-Neuronopathic Chronic Adult Gaucher Disease, Non-Scarring
 Epidermolysis Bullosa, Nonarteriosclerotic Cerebral Calcifications, Nonarticular

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Rheumatism, Noncerebral, Juvenile Gaucher Disease, Nondiabetic Glycosuria,
 Nonischemic Cardio myopathy, Nonketotic Hypoglycemia and Carnitine Deficiency due
 to MCAD Deficiency, Nonketotic Hypoglycemia Caused by Deficiency of Acyl-CoA
 Dehydrogenase, Nonketotic Glycinemia, Nonne's Syndrome, Nonne-Milroy-Meige
 5 Syndrome, Nonopalescent Opalescent Dentine, Nonpuerperal Galactorrhea-Amenorrhea,
 Nonsecretory Myeloma, Nonspherocytic Hemolytic Anemia, Nontropical Sprue, Noonan
 Syndrome, Norepinephrine, Normal Pressure Hydrocephalus, Norman-Roberts Syndrome,
 Norrbottnian Gaucher Disease, Norrie Disease, Norwegian Type Hereditary Cholestasis,
 NPD, NPS, NS, NSA, Nuchal Dystonia Dementia Syndrome, Nutritional Neuropathy,
 10 Nyhan Syndrome, OAV Spectrum, Obstructive Apnea, Obstructive Hydrocephalus,
 Obstructive Sleep Apnea, OCC Syndrome, Occlusive Thromboaspathy, OCCS, Occult
 Intracranial Vascular Malformations, Occult Spinal Dysraphism Sequence, Ochoa
 Syndrome, Ochronosis, Ochronotic Arthritis, OCR, OCRL, Octocephaly, Ocular Albinism,
 Ocular Herpes, Ocular Myasthenia Gravis, Oculo-Auriculo-Vertebral Dysplasia, Oculo-
 15 Auriculo-Vertebral Spectrum, Oculo-Bucco-Genital Syndrome, Oculocerebral Syndrome
 with Hypopigmentation, Oculocerebrocutaneous Syndrome, Oculo-Cerebro-Renal,
 Oculocerebrorenal Dystrophy, Oculocerebrorenal Syndrome, Oculocraniosomatic
 Syndrome (obsolete), Oculocutaneous Albinism, Oculocutaneous Albinism Chediak-
 Higashi Type, Oculo-Dento-Digital Dysplasia, Oculodentodigital Syndrome, Oculo-Dento-
 20 Osseous Dysplasia, Oculo Gastrointestinal Muscular Dystrophy, Oculo Gastrointestinal
 Muscular Dystrophy, Oculomandibulodyscephaly with hypotrichosis,
 Oculomandibulofacial Syndrome, Oculomotor with Congenital Contractures and Muscle
 Atrophy, Oculosympathetic Palsy, ODD Syndrome, ODOD, Odontogenic Tumor,
 Odontotrichomelic Syndrome, OFD, OFD Syndrome, Ohio Type Amyloidosis (Type VII),
 25 OI, OI Congenita, OI Tarda, Oldfield Syndrome, Oligohydramnios Sequence,
 Oligophrenia Microphthalmos, Oligophrenic Polydystrophy, Olivopontocerebellar
 Atrophy, Olivopontocerebellar Atrophy with Dementia and Extrapyrmidal Signs,
 Olivopontocerebellar Atrophy with Retinal Degeneration, Olivopontocerebellar Atrophy I,
 Olivopontocerebellar Atrophy II, Olivopontocerebellar Atrophy III, Olivopontocerebellar
 30 Atrophy IV, Olivopontocerebellar Atrophy V, Ollier Disease, Ollier Osteochondromatosis,
 Omphalocele-Visceromegaly-Macroglossia Syndrome, Ondine's Curse, Onion-Bulb

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Neuropathy, Onion Bulb Polyneuropathy, Onychoosteodysplasia, Onychotrichodysplasia with Neutropenia, OPCA, OPCA I, OPCA II, OPCA III, OPCA IV, OPCA V, OPD Syndrome, OPD Syndrome Type I, OPD Syndrome Type II, OPD I Syndrome, OPD II Syndrome, Ophthalmoarthropathy, Ophthalmoplegia-Intestinal Pseudoobstruction,

5 Ophthalmoplegia, Pigmentary Degeneration of the Retina and Cardio myopathy, Ophthalmoplegia Plus Syndrome, Ophthalmoplegia Syndrome, Opitz BBB Syndrome, Opitz BBB/G Compound Syndrome, Opitz BBBG Syndrome, Opitz-Frias Syndrome, Opitz G Syndrome, Opitz G/BBB Syndrome, Opitz Hypertelorism-Hypospadias Syndrome, Opitz-Kaveggia Syndrome, Opitz Oculogenitolaryngeal Syndrome, Opitz

10 Trigenocephaly Syndrome, Opitz Syndrome, Opsoclonus, Opsoclonus-Myoclonus, Ophthalmoneuromyelitis, Optic Atrophy Polyneuropathy and Deafness, Optic Neuroencephalomyelopathy, Optic Neuromyelitis, Opticomyelitis, Optochiasmatic Arachnoiditis, Oral-Facial Clefts, Oral-facial Dyskinesia, Oral Facial Dystonia, Oral-Facial-Digital Syndrome, Oral-Facial-Digital Syndrome Type I, Oral-Facial-Digital

15 Syndrome I, Oral-Facial-Digital Syndrome II, Oral-Facial-Digital Syndrome III, Oral-Facial-Digital Syndrome IV, Orbital Cyst with Cerebral and Focal Dermal Malformations, Ornithine Carbamyl Transferase Deficiency, Ornithine Transcarbamylase Deficiency, Orocraniodigital Syndrome, Orofaciodigital Syndrome, Oromandibular Dystonia, Orthostatic Hypotension, Osler-Weber-Rendu disease, Osseous-Oculo-Dento Dysplasia,

20 Osseous-Oculo-Dento Dysplasia, Osteitis deformans, Osteochondrodystrophy Deformans, Osteochondroplasia, Osteodysplasty of Melnick and Needles, Osteogenesis Imperfect, Osteogenesis Imperfecta, Osteogenesis Imperfecta Congenita, Osteogenesis Imperfecta Tarda, Osteohypertrophic Nevus Flammeus, Osteopathia Hyperostotica Scleroticans Multiplex Infantilis, Osteopathia Hyperostotica Scleroticans Multiplex Infantilis,

25 Osteopathyrosis, Osteopetrosis, Osteopetrosis Autosomal Dominant Adult Type, Osteopetrosis Autosomal Recessive Malignant Infantile Type, Osteopetrosis Mild Autosomal Recessive Intermediate Typ, Osteosclerosis Fragilis Generalisata, Osteosclerotic Myeloma, Ostium Primum Defect (endocardial cushion defects included), Ostium Secundum Defect, OTC Deficiency, Oto Palato Digital Syndrome, Oto-Palato-

30 Digital Syndrome Type I, Oto-Palatal-Digital Syndrome Type II, Otodental Dysplasia, Otopalatodigital Syndrome, Otopalataldigital Syndrome Type II, Oudtshoorn Skin,

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Ovarian Dwarfism Turner Type, Ovary Aplasia Turner Type, OWR, Oxalosis, Oxidase deficiency, Oxycephaly, Oxycephaly-Acrocephaly, P-V, PA, PAC, Pachyonychia Ichtyosiforme, Pachyonychia Congenita with Natal Teeth, Pachyonychia Congenita, Pachyonychia Congenita Keratosis Disseminata Circumscripta (follicularis), Pachyonychia
5 Congenita Jadassohn-Lewandowsky Type, PAF with MSA, Paget's Disease, Paget's Disease of Bone, Paget's Disease of the Breast, Paget's Disease of the Nipple, Paget's Disease of the Nipple and Areola, Pagon Syndrome, Painful Ophthalmoplegia, PAIS, Palatal Myoclonus, Palato-Oto-Digital Syndrome, Palato-Oto-Digital Syndrome Type I, Palato-Oto-Digital Syndrome Type II, Pallister Syndrome, Pallister-Hall Syndrome,
10 Pallister-Killian Mosaic Syndrome, Pallister Mosaic Aneuploidy, Pallister Mosaic Syndrome, Pallister Mosaic Syndrome Tetrasomy 12p, Pallister-W Syndrome, Palmoplantar Hyperkeratosis and Alopecia, Palsy, Pancreatic Fibrosis, Pancreatic Insufficiency and Bone Marrow Dysfunction, Pancreatic Ulcerogenic Tumor Syndrome, Panmyelophthisis, Panmyelopathy, Pantothenate kinase associated neurodegeneration
15 (PKAN), Papillon-Lefevre Syndrome, Papillotonic Psuedotabes, Paralysis Periodica Paramyotonia, Paralytic Beriberi, Paralytic Brachial Neuritis, Paramedian Lower Lip Pits-Popliteal Pyerygium Syndrome, Paramedian Diencephalic Syndrome, Paramyeloidosis, Paramyoclonus Multiple, Paramyotonia Congenita, Paramyotonia Congenita of Von Eulenburg, Parkinson's disease, Paroxysmal Atrial Tachycardia, Paroxysmal Cold
20 Hemoglobinuria, Paroxysmal Dystonia, Paroxysmal Dystonia Choreathetosis, Paroxysmal Kinesigenic Dystonia, Paroxysmal Nocturnal Hemoglobinuria, Paroxysmal Normal Hemoglobinuria, Paroxysmal Sleep, Parrot Syndrome, Parry Disease, Parry-Romberg Syndrome, Parsonage-Turner Syndrome, Partial Androgen Insensitivity Syndrome, Partial Deletion of the Short Arm of Chromosome 4, Partial Deletion of the Short Arm of
25 Chromosome 5, Partial Deletion of Short Arm of Chromosome 9, Partial Duplication 3q Syndrome, Partial Duplication 15q Syndrome, Partial Facial Palsy With Urinary Abnormalities, Partial Gigantism of Hands and Feet- Nevi-Hemihypertrophy-Macrocephaly, Partial Lipodystrophy, Partial Monosomy of Long Arm of Chromosome 11, Partial Monosomy of the Long Arm of Chromosome 13, Partial Spinal Sensory
30 Syndrome, Partial Trisomy 11q, Partington Syndrome, PAT, Patent Ductus Arteriosus, Pathological Myoclonus, Pauciarticular-Onset Juvenile Arthritis, Paulitis, PBC, PBS, PC

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Deficiency, PC Deficiency Group A, PC Deficiency Group B, PC, Eulenburg Disease,
 PCC Deficiency, PCH, PCLD, PCT, PD, PDA, PDH Deficiency, Pearson Syndrome
 Pyruvate Carboxylase Deficiency, Pediatric Obstructive Sleep Apnea, Peeling Skin
 Syndrome, Pelizaeus-Merzbacher Disease, Pelizaeus-Merzbacher Brain Sclerosis,
 5 Pellagra-Cerebellar Ataxia-Renal Aminoaciduria Syndrome, Pelvic Pain Syndrome,
 Pemphigus Vulgaris, Pena Shokeir II Syndrome, Pena Shokeir Syndrome Type II, Penile
 Fibromatosis, Penile Fibrosis, Penile Induration, Penta X Syndrome, Pentalogy of Cantrell,
 Pentalogy Syndrome, Pentasomy X, PEPCCK Deficiency, Pepper Syndrome, Perheentupa
 Syndrome, Periarticular Fibrositis, Pericardial Constriction with Growth Failure,
 10 Pericollagen Amyloidosis, Perinatal Polycystic Kidney Diseases, Perineal Anus, Periodic
 Amyloid Syndrome, Periodic Peritonitis Syndrome, Periodic Somnolence and Morbid
 Hunger, Periodic Syndrome, Peripheral Cystoid Degeneration of the Retina, Peripheral
 Dysostosis-Nasal Hypoplasia-Mental Retardation, Peripheral Neuritis, Peripheral
 Neuropathy, Peritoneopericardial Diaphragmatic Hernia, Pernicious Anemia, Peromelia
 15 with Micrognathia, Peroneal Muscular Atrophy, Peroneal Nerve Palsy, Peroutka Sneeze,
 Peroxisomal Acyl-CoA Oxidase, Peroxisomal Beta-Oxidation Disorders, Peroxisomal
 Bifunctional Enzyme, Peroxisomal Thiolase, Peroxisomal Thiolase Deficiency, Persistent
 Truncus Arteriosus, Perthes Disease, Petit Mal Epilepsy, Petit Mal Variant, Peutz-Jeghers
 Syndrome, Peutz-Touraine Syndrome, Peyronie Disease, Pfeiffer, Pfeiffer Syndrome Type
 20 I, PGA I, PGA II, PGA III, PGK, PH Type I, PH Type I, Pharyngeal Pouch Syndrome,
 PHD Short-Chain Acyl-CoA Dehydrogenase Deficiency, Phenylalanine Hydroxylase
 Deficiency, Phenylalaninemia, Phenylketonuria, Phenylpyruvic Oligophrenia, Phocomelia,
 Phocomelia Syndrome, Phosphoenolpyruvate Carboxykinase Deficiency,
 Phosphofructokinase Deficiency, Phosphoglycerate Kinase Deficiency,
 25 Phosphoglycerokinase, Phosphorylase 6 Kinase Deficiency, Phosphorylase Deficiency
 Glycogen Storage Disease, Phosphorylase Kinase Deficiency of Liver, Photic Sneeze
 Reflex, Photic Sneezing, Phototherapeutic keratectomy, PHS, Physicist John Dalton,
 Phytanic Acid Storage Disease, Pi Phenotype ZZ, PI, Pick Disease of the Brain, Pick's
 Disease, Pickwickian Syndrome, Pierre Robin Anomalad, Pierre Robin Complex, Pierre
 30 Robin Sequence, Pierre Robin Syndrome, Pierre Robin Syndrome with Hyperphalangy and
 Clinodactyly, Pierre-Marie's Disease, Pigmentary Degeneration of Globus Pallidus

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Substantia Nigra Red Nucleus, Pili Torti and Nerve Deafness, Pili Torti-Sensorineural Hearing Loss, Pituitary Dwarfism II, Pituitary Tumor after Adrenalectomy, Pityriasis Pilaris, Pityriasis Rubra Pilaris, PJS, PKAN, PKD, PKD1, PKD2, PKD3, PKU, PKU1, Plagiocephaly, Plasma Cell Myeloma, Plasma Cell Leukemia, Plasma Thromboplastin

5 Component Deficiency, Plasma Transglutaminase Deficiency, Plastic Induration Corpora Cavernosa, Plastic Induration of the Penis, PLD, Plicated Tongue, PLS, PMD, Pneumorenal Syndrome, PNH, PNM, PNP Deficiency, POD, POH, Poikiloderma Atrophicans and Cataract, Poikiloderma Congenitale, Poland Anomaly, Poland Sequence, Poland Syndactyly, Poland Syndrome, Poliodystrophia Cerebri Progressiva, Polyarthritis

10 Enterica, Polyarteritis Nodosa, Polyarticular-Onset Juvenile Arthritis Type I, Polyarticular-Onset Juvenile Arthritis Type II, Polyarticular-Onset Juvenile Arthritis Types I and II, Polychondritis, Polycystic Kidney Disease, Polycystic Kidney Disease Medullary Type, Polycystic Liver Disease, Polycystic Ovary Disease, Polycystic Renal Diseases, Polydactyly-Joubert Syndrome, Polydysplastic Epidermolysis Bullosa, Polydystrophia

15 Oligophrenia, Polydystrophic Dwarfism, Polyglandular Autoimmune Syndrome Type III, Polyglandular Autoimmune Syndrome Type II, Polyglandular Autoimmune Syndrome Type I, Polyglandular Autoimmune Syndrome Type II, Polyglandular Deficiency Syndrome Type II, Polyglandular Syndromes, Polymorphic Macula Lutea Degeneration, Polymorphic Macular Degeneration, Polymorphism of Platelet Glycoprotein Ib,

20 Polymorphous Corneal Dystrophy Hereditary, Polymyalgia Rheumatica, Polymyositis and Dermatomyositis, Primary Agammaglobulinemia, Polyneuritis Peripheral, Polyneuropathy-Deafness-Optic Atrophy, Polyneuropathy Peripheral, Polyneuropathy and Polyradiculoneuropathy, Polyostotic Fibrous Dysplasia, Polyostotic Sclerosing Histiocytosis, Polyposis Familial, Polyposis Gardner Type, Polyposis Hamartomatous

25 Intestinal, Polyposis-Osteomatosis-Epidermoid Cyst Syndrome, Polyposis Skin Pigmentation Alopecia and Fingernail Changes, Polyps and Spots Syndrome, Polyserositis Recurrent, Polysomy Y, Polysyndactyly with Peculiar Skull Shape, Polysyndactyly-Dysmorphic Craniofacies Greig Type, Pompe Disease, Pompe Disease, Popliteal Pterygium Syndrome, Porcupine Man, Porencephaly, Porencephaly, Porphobilinogen deaminase (PBG-D), Porphyria, Porphyria Acute Intermittent, Porphyria ALA-D,

30 Porphyria Cutanea Tarda, Porphyria Cutanea Tarda Hereditaria, Porphyria Cutanea Tarda

Symptomatica, Porphyria Hepatica Variegata, Porphyria Swedish Type, Porphyria
 Variegata, Porphyria Acute Intermittent, Porphyrins, Porrigo Decalvans, Port Wine
 Stains, Portuguese Type Amyloidosis, Post-Infective Polyneuritis, Postanoxic Intention
 Myoclonus, Postaxial Acrofacial Dysostosis, Postaxial Polydactyly, Postencephalitic
 5 Intention Myoclonus, Posterior Corneal Dystrophy Hereditary, Posterior Thalamic
 Syndrome, Postmyelographic Arachnoiditis, Postnatal Cerebral Palsy, Postoperative
 Cholestasis, Postpartum Galactorrhea-Amenorrhea Syndrome, Postpartum
 Hypopituitarism, Postpartum Panhypopituitary Syndrome, Postpartum Panhypopituitarism,
 Postpartum Pituitary Necrosis, Postural Hypotension, Potassium-Losing Nephritis,
 10 Potassium Loss Syndrome, Potter Type I Infantile Polycystic Kidney Diseases, Potter Type
 III Polycystic Kidney Disease, PPH, PPS, Prader-Willi Syndrome, Prader-Labhart-Willi
 Fancone Syndrome, Prealbumin Tyr-77 Amyloidosis, Preexcitation Syndrome,
 Pregnenolone Deficiency, Premature Atrial Contractions, Premature Senility Syndrome,
 Premature Supraventricular Contractions, Premature Ventricular Complexes, Prenatal or
 15 Connatal Neuroaxonal Dystrophy, Presenile Dementia, Presenile Macula Lutea Retinae
 Degeneration, Primary Adrenal Insufficiency, Primary Agammaglobulinemias, Primary
 Aldosteronism, Primary Alveolar Hypoventilation, Primary Amyloidosis, Primary Anemia,
 Primary Beriberi, Primary Biliary, Primary Biliary Cirrhosis, Primary Brown Syndrome,
 Primary Carnitine Deficiency, Primary Central Hypoventilation Syndrome, Primary
 20 Ciliary Dyskinesia Kartagener Type, Primary Cutaneous Amyloidosis, Primary Dystonia,
 Primary Failure Adrenocortical Insufficiency, Primary Familial Hypoplasia of the Maxilla,
 Primary Hemochromatosis, Primary Hyperhidrosis, Primary Hyperoxaluria [Type I],
 Primary Hyperoxaluria Type 1 (PH1), Primary Hyperoxaluria Type 1, Primary
 Hyperoxaluria Type II, Primary Hyperoxaluria Type III, Primary Hypogonadism, Primary
 25 Intestinal Lymphangiectasia, Primary Lateral Sclerosis, Primary Nonhereditary
 Amyloidosis, Primary Obliterative Pulmonary Vascular Disease, Primary Progressive
 Multiple Sclerosis, Primary Pulmonary Hypertension, Primary Reading Disability, Primary
 Renal Glycosuria, Primary Sclerosing Cholangitis, Primary Thrombocythemia, Primary
 Tumors of Central Nervous System, Primary Visual Agnosia, Proctocolitis Idiopathic,
 30 Proctocolitis Idiopathic, Progeria of Adulthood, Progeria of Childhood, Progeroid Nanism,
 Progeroid Short Stature with Pigmented Nevi, Progeroid Syndrome of De Barys,

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Progressive Autonomic Failure with Multiple System Atrophy, Progressive Bulbar Palsy,
 Progressive Bulbar Palsy Included, Progressive Cardiomyopathic Lentiginosis, Progressive
 Cerebellar Ataxia Familial, Progressive Cerebral Poliodystrophy, Progressive Choroidal
 Atrophy, Progressive Diaphyseal Dysplasia, Progressive Facial Hemiatrophy, Progressive
 5 Familial Myoclonic Epilepsy, Progressive Hemifacial Atrophy, Progressive
 Hypoerythemia, Progressive Infantile Poliodystrophy, Progressive Lenticular
 Degeneration, Progressive Lipodystrophy, Progressive Muscular Dystrophy of Childhood,
 Progressive Myoclonic Epilepsy, Progressive Osseous Heteroplasia, Progressive Pallid
 Degeneration Syndrome, Progressive Spinobulbar Muscular Atrophy, Progressive
 10 Supranuclear Palsy, Progressive Systemic Sclerosis, Progressive Tapetochoroidal
 Dystrophy, Proline Oxidase Deficiency, Propionic Acidemia, Propionic Acidemia Type I
 (PCCA Deficiency), Propionic Acidemia Type II (PCCB Deficiency), Propionyl CoA
 Carboxylase Deficiency, Protanomaly, Protanopia, Protein-Losing Enteropathy Secondary
 to Congestive Heart Failure, Proteus Syndrome, Proximal Deletion of 4q Included, PRP,
 15 PRS, Prune Belly Syndrome, PS, Pseudo-Hurler Polydystrophy, Pseudo-Polydystrophy,
 Pseudoacanthosis Nigricans, Pseudoachondroplasia, Pseudocholinesterase Deficiency,
 Pseudogout Familial, Pseudohemophilia, Pseudohermaphroditism,
 Pseudohermaphroditism-Nephron Disorder-Wilm's Tumor, Pseudohypertrophic Muscular
 Dystrophy, Pseudohypoparathyroidism, Pseudohypophosphatasia, Pseudopolydystrophy,
 20 Pseudothalidomide Syndrome, Pseudoxanthoma Elasticum, Psoriasis, Psorospermiosis
 Follicularis, PSP, PSS, Psychomotor Convulsion, Psychomotor Epilepsy, Psychomotor
 Equivalent Epilepsy, PTC Deficiency, Pterygium, Pterygium Colli Syndrome, Pterygium
 Universale, Pterygolympangiectasia, Pulmonary Atresia, Pulmonary
 Lymphangiomyomatosis, Pulmonary Stenosis, Pulmonic Stenosis-Ventricular Septal
 25 Defect, Pulp Stones, Pulpal Dysplasia, Pulseless Disease, Pure A lymphocytosis, Pure
 Cutaneous Histiocytosis, Purine Nucleoside Phosphorylase Deficiency, Purpura
 Hemorrhagica, Purtilo Syndrome, PXE, PXE Dominant Type, PXE Recessive Type,
 Pycnodysostosis, Pyknodysostosis, Pyknoepilepsy, Pyroglutamic Aciduria,
 Pyroglutamicaciduria, Pyrroline Carboxylate Dehydrogenase Deficiency, Pyruvate
 30 Carboxylase Deficiency, Pyruvate Carboxylase Deficiency Group A, Pyruvate
 Carboxylase Deficiency Group B, Pyruvate Dehydrogenase Deficiency, Pyruvate Kinase

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Deficiency, q25-qter, q26 or q27-qter, q31 or 32-qter, QT Prolongation with Extracellular
 Hypohypocalcemia, QT Prolongation without Congenital Deafness, QT Prolonged with
 Congenital Deafness, Quadripareisis of Cerebral Palsy, Quadriplegia of Cerebral Palsy,
 Quantal Squander, Quantal Squander, r4, r6, r14, r 18, r21, r22, Rachischisis Posterior,
 5 Radial Aplasia-Amegakaryocytic Thrombocytopenia, Radial Aplasia-Thrombocytopenia
 Syndrome, Radial Nerve Palsy, Radicular Neuropathy Sensory, Radicular Neuropathy
 Sensory Recessive, Radicular Dentin Dysplasia, Rapid-onset Dystonia-parkinsonism,
 Rapp-Hodgkin Syndrome, Rapp-Hodgkin (hypohidrotic) Ectodermal Dysplasia syndrome,
 Rapp-Hodgkin Hypohidrotic Ectodermal Dysplasias, Rare hereditary ataxia with
 10 polyneuritic changes and deafness caused by a defect in the enzyme phytanic acid
 hydroxylase, Rautenstrauch-Wiedemann Syndrome, Rautenstrauch-Wiedemann Type
 Neonatal Progeria, Raynaud's Phenomenon, RDP, Reactive Functional Hypoglycemia,
 Reactive Hypoglycemia Secondary to Mild Diabetes, Recessive Type Kenny-Caffe
 Syndrome, Recklin Recessive Type Myotonia Congenita, Recklinghausen Disease,
 15 Rectoperineal Fistula, Recurrent Vomiting, Reflex Neurovascular Dystrophy, Reflex
 Sympathetic Dystrophy Syndrome, Refractive Errors, Refractory Anemia, Refrigeration
 Palsy, Refsum Disease, Refsum's Disease, Regional Enteritis, Reid-Barlow's syndrome,
 Reifenstein Syndrome, Reiger Anomaly-Growth Retardation, Reiger Syndrome, Reimann
 Periodic Disease, Reimann's Syndrome, Reis-Bucklers Corneal Dystrophy, Reiter's
 20 Syndrome, Relapsing Guillain-Barre Syndrome, Relapsing-Remitting Multiple Sclerosis,
 Renal Agenesis, Renal Dysplasia-Blindness Hereditary, Renal Dysplasia-Retinal Aplasia
 Loken-Senior Type, Renal Glycosuria, Renal Glycosuria Type A, Renal Glycosuria Type
 B, Renal Glycosuria Type O, Renal-Oculocerebrodystrophy, Renal-Retinal Dysplasia with
 Medullary Cystic Disease, Renal-Retinal Dystrophy Familial, Renal-Retinal Syndrome,
 25 Rendu-Osler-Weber Syndrome, Respiratory Acidosis, Respiratory Chain Disorders,
 Respiratory Myoclonus, Restless Legs Syndrome, Restrictive Cardio myopathy, Retention
 Hyperlipemia, Rethore Syndrome (obsolete), Reticular Dysgenesis, Retinal Aplastic-
 Cystic Kidneys-Joubert Syndrome, Retinal Cone Degeneration, Retinal Cone Dystrophy,
 Retinal Cone-Rod Dystrophy, Retinitis Pigmentosa, Retinitis Pigmentosa and Congenital
 30 Deafness, Retinoblastoma, Retinol Deficiency, Retinoschisis, Retinoschisis Juvenile,
 Retraction Syndrome, Retrobulbar Neuropathy, Retrolenticular Syndrome, Rett Syndrome,

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Reverse Coarction, Reye Syndrome, Reye's Syndrome, RGS, Rh Blood Factors, Rh Disease, Rh Factor Incompatibility, Rh Incompatibility, Rhesus Incompatibility, Rheumatic Fever, Rheumatoid Arthritis, Rheumatoid Myositis, Rhinosinusogenic Cerebral Arachnoiditis, Rhizomelic Chondrodysplasia Punctata (RCDP), Acatalasemia, Classical

5 Refsum disease, RHS, Rhythmical Myoclonus, Rib Gap Defects with Micrognathia, Ribbing Disease (obsolete), Ribbing Disease, Richner-Hanhart Syndrome, Rieger Syndrome, Rieter's Syndrome, Right Ventricular Fibrosis, Riley-Day Syndrome, Riley-Smith syndrome, Ring Chromosome 14, Ring Chromosome 18, Ring 4, Ring 4 Chromosome, Ring 6, Ring 6 Chromosome, Ring 9, Ring 9 Chromosome R9, Ring 14,

10 Ring 15, Ring 15 Chromosome (mosaic pattern), Ring 18, Ring Chromosome 18, Ring 21, Ring 21 Chromosome, Ring 22, Ring 22 Chromosome, Ritter Disease, Ritter-Lyell Syndrome, RLS, RMSS, Roberts SC-Phocomelia Syndrome, Roberts Syndrome, Roberts Tetraphocomelia Syndrome, Robertson's Ectodermal Dysplasias, Robin Anomalad, Robin Sequence, Robin Syndrome, Robinow Dwarfism, Robinow Syndrome, Robinow

15 Syndrome Dominant Form, Robinow Syndrome Recessive Form, Rod myopathy, Roger Disease, Rokitansky's Disease, Romano-Ward Syndrome, Romberg Syndrome, Rootless Teeth, Rosenberg-Chutorian Syndrome, Rosewater Syndrome, Rosselli-Gulienatti Syndrome, Rothmund-Thomson Syndrome, Roussy-Levy Syndrome, RP, RS X-Linked, RS, RSDS, RSH Syndrome, RSS, RSTS, RTS, Rubella Congenital, Rubinstein Syndrome,

20 Rubinstein-Taybi Syndrome, Rubinstein Taybi Broad Thumb-Hallux syndrome, Rufous Albinism, Ruhr's Syndrome, Russell's Diencephalic Cachexia, Russell's Syndrome, Russell Syndrome, Russell-Silver Dwarfism, Russell-Silver Syndrome, Russell-Silver Syndrome X-linked, Ruvalcaba-Myhre-Smith syndrome (RMSS), Ruvalcaba Syndrome, Ruvalcaba Type Osseous Dysplasia with Mental Retardation, Sacral Regression, Sacral

25 Agensis Congenital, SAE, Saethre-Chotzen Syndrome, Sakati, Sakati Syndrome, Sakati-Nyhan Syndrome, Salaam Spasms, Salivosudoriparous Syndrome, Salzman Nodular Corneal Dystrophy, Sandhoff Disease, Sanfilippo Syndrome, Sanfilippo Type A, Sanfilippo Type B, Santavuori Disease, Santavuori-Haltia Disease, Sarcoid of Boeck, Sarcoidosis, Sathre-chotzen, Saturday Night Palsy, SBMA, SC Phocomelia Syndrome, SC

30 Syndrome, SCA 3, SCAD Deficiency, SCAD Deficiency Adult-Onset Localized, SCAD Deficiency Congenital Generalized, SCAD, SCADH Deficiency, Scalded Skin Syndrome,

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- Scalp Defect Congenital, Scaphocephaly, Scapula Elevata, Scapuloperoneal myopathy, Scapuloperoneal Muscular Dystrophy, Scapuloperoneal Syndrome Myopathic Type, Scarring Bullosa, SCHAD, Schaumann's Disease, Scheie Syndrome, Schereshevskii-Turner Syndrome, Schilder Disease, Schilder Encephalitis, Schilder's Disease, Schindler Disease
- 5 Type I (Infantile Onset), Schindler Disease Infantile Onset, Schindler Disease, Schindler Disease Type II (Adult Onset), Schinzel Syndrome, Schinzel-Giedion Syndrome, Schinzel Acrocallosal Syndrome, Schinzel-Giedion Midface-Retraktion Syndrome, Schizencephaly, Schmid Type Metaphyseal Chondrodysplasia, Schmid Metaphyseal Dysostosis, Schmid-Fraccaro Syndrome, Schmidt Syndrome, Schopf-Schultz-Passarge Syndrome, Schueller-
- 10 Christian Disease, Schut-Haymaker Type, Schwartz-Jampel-Aberfeld Syndrome, Schwartz-Jampel Syndrome Types 1A and 1B, Schwartz-Jampel Syndrome, Schwartz-Jampel Syndrome Type 2, SCID, Scleroderma, Sclerosis Familial Progressive Systemic, Sclerosis Diffuse Familial Brain, Scott Craniodigital Syndrome With Mental Retardation, Scrotal Tongue, SCS, SD, SDS, SDYS, Seasonal Conjunctivitis, Sebaceous Nevus
- 15 Syndrome, Sebaceous nevus, Seborrheic Keratosis, Seborrheic Warts, Seckel Syndrome, Seckel Type Dwarfism, Second Degree Congenital Heart Block, Secondary Amyloidosis, Secondary Blepharospasm, Secondary Non-tropical Sprue, Secondary Brown Syndrome, Secondary Beriberi, Secondary Generalized Amyloidosis, Secondary Dystonia, Secretory Component Deficiency, Secretory IgA Deficiency, SED Tarda, SED Congenital, SEDC,
- 20 Segmental linear achromic nevus, Segmental Dystonia, Segmental Myoclonus, Seip Syndrome, Seitelberger Disease, Seizures, Selective Deficiency of IgG Subclasses, Selective Mutism, Selective Deficiency of IgG Subclass, Selective IgM Deficiency, Selective Mutism, Selective IgA Deficiency, Self-Healing Histiocytosis, Semilobar Holoprosencephaly, Seminiferous Tubule Dysgenesis, Senile Retinoschisis, Senile Warts,
- 25 Senior-Loken Syndrome, Sensory Neuropathy Hereditary Type I, Sensory Neuropathy Hereditary Type II, Sensory Neuropathy Hereditary Type I, Sensory Radicular Neuropathy, Sensory Radicular Neuropathy Recessive, Septic Progressive Granulomatosis, Septo-Optic Dysplasia, Serous Circumscribed Meningitis, Serum Protease Inhibitor Deficiency, Serum Carnosinase Deficiency, Setleis Syndrome, Severe Combined
- 30 Immunodeficiency, Severe Combined Immunodeficiency with Adenosine Deaminase Deficiency, Severe Combined Immunodeficiency (SCID), Sex Reversal, Sexual

Infantilism, SGB Syndrome, Sheehan Syndrome, Shields Type Dentinogenesis Imperfecta, Shingles, varicella-zoster virus, Ship Beriberi, SHORT Syndrome, Short Arm 18 Deletion Syndrome, Short Chain Acyl CoA Dehydrogenase Deficiency, Short Chain Acyl-CoA Dehydrogenase (SCAD) Deficiency, Short Stature and Facial Telangiectasis, Short Stature
 5 Facial/Skeletal Anomalies-Retardation-Macrodontia, Short Stature-Hyperextensibility-Rieger Anomaly-Teething Delay, Short Stature-Onychodysplasia, Short Stature Telangiectatic Erythema of the Face, SHORT Syndrome, Shoshin Beriberi, Shoulder girdle syndrome, Shprintzen-Goldberg Syndrome, Shulman Syndrome, Shwachman-Bodian Syndrome, Shwachman-Diamond Syndrome, Shwachman Syndrome, Shwachman-
 10 Diamond-Oski Syndrome, Shwachmann Syndrome, Shy Drager Syndrome, Shy-Magee Syndrome, SI Deficiency, Sialidase Deficiency, Sialidosis Type I Juvenile, Sialidosis Type II Infantile, Sialidosis, Sialolipidosis, Sick Sinus Syndrome, Sick Cell Anemia, Sick Cell Disease, Sick Cell-Hemoglobin C Disease, Sick Cell-Hemoglobin D Disease, Sick Cell-Thalassemia Disease, Sick Cell Trait, Sideroblastic Anemias, Sideroblastic
 15 Anemia, Sideroblastosis, SIDS, Siegel-Cattan-Mamou Syndrome, Siemens-Bloch type Pigmented Dermatitis, Siemens Syndrome, Siewerling-Creutzfeldt Disease, Siewert Syndrome, Silver Syndrome, Silver-Russell Dwarfism, Silver-Russell Syndrome, Simmond's Disease, Simons Syndrome, Simplex Epidermolysis Bullosa, Simpson Dysmorphia Syndrome, Simpson-Golabi-Behmel Syndrome, Sinding-Larsen-Johansson
 20 Disease, Singleton-Merten Syndrome, Sinus Arrhythmia, Sinus Venosus, Sinus tachycardia, Sirenomelia Sequence, Sirenomelus, Situs Inversus Bronchiectasis and Sinusitis, SJA Syndrome, Sjogren Larsson Syndrome Ichthyosis, Sjogren Syndrome, Sjögren's Syndrome, SJS, Skeletal dysplasia, Skeletal Dysplasia Weismann Netter Stuhl Type, Skin Peeling Syndrome, Skin Neoplasms, Skull Asymmetry and Mild Retardation,
 25 Skull Asymmetry and Mild Syndactyly, SLE, Sleep Epilepsy, Sleep Apnea, SLO, Sly Syndrome, SMA, SMA Infantile Acute Form, SMA I, SMA III, SMA type I, SMA type II, SMA type III, SMA3, SMAX1, SMCR, Smith Lemli Opitz Syndrome, Smith Magenis Syndrome, Smith-Magenis Chromosome Region, Smith-McCort Dwarfism, Smith-Opitz-Inborn Syndrome, Smith Disease, Smoldering Myeloma, SMS, SNE, Sneezing From Light
 30 Exposure, Sodium valproate, Solitary Plasmacytoma of Bone, Sorsby Disease, Sotos Syndrome, Souques-Charcot Syndrome, South African Genetic Porphyria, Spasmodic

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Dysphonia, Spasmodic Torticollis, Spasmodic Wryneck, Spastic Cerebral Palsy, Spastic
 Colon, Spastic Dysphonia, Spastic Paraplegia, SPD Calcinosis, Specific Antibody
 Deficiency with Normal Immunoglobulins, Specific Reading Disability, SPH2,
 Spherocytic Anemia, Spherocytosis, Spherophakia-Brachymorphia Syndrome,
 5 Sphingomyelin Lipidosis, Sphingomyelinase Deficiency, Spider fingers, Spielmeyer-Vogt
 Disease, Spielmeyer-Vogt-Batten Syndrome, Spina Bifida, Spina Bifida Aperta, Spinal
 Arachnoiditis, Spinal Arteriovenous Malformation, Spinal Ataxia Hereditofamilial, Spinal
 and Bulbar Muscular Atrophy, Spinal Diffuse Idiopathic Skeletal Hyperostosis, Spinal
 DISH, Spinal Muscular Atrophy, Spinal Muscular Atrophy All Types, Spinal Muscular
 10 Atrophy Type ALS, Spinal Muscular Atrophy-Hypertrophy of the Calves, Spinal Muscular
 Atrophy Type I, Spinal Muscular Atrophy Type III, Spinal Muscular Atrophy type 3,
 Spinal Muscular Atrophy-Hypertrophy of the Calves, Spinal Ossifying Arachnoiditis,
 Spinal Stenosis, Spino Cerebellar Ataxia, Spinocerebellar Atrophy Type I, Spinocerebellar
 Ataxia Type I (SCA1), Spinocerebellar Ataxia Type II (SCAII), Spinocerebellar Ataxia
 15 Type III (SCAIII), Spinocerebellar Ataxia Type III (SCA 3), Spinocerebellar Ataxia Type
 IV (SCAIV), Spinocerebellar Ataxia Type V (SCAV), Spinocerebellar Ataxia Type VI
 (SCAVI), Spinocerebellar Ataxia Type VII (SCAVII), Spirochetal Jaundice, Splenic
 Agenesis Syndrome, Splenic Ptosis, Splenoptosis, Split Hand Deformity-Mandibulofacial
 Dysostosis, Split Hand Deformity, Spondyloarthritis, Spondylocostal Dysplasia - Type I,
 20 Spondyloepiphyseal Dysplasia Tarda, Spondylothoracic Dysplasia, Spondylotic Caudal
 Radiculopathy, Sponge Kidney, Spongioblastoma Multiforme, Spontaneous
 Hypoglycemia, Sprengel Deformity, Spring Ophthalmia, SRS, ST, Stale Fish Syndrome,
 Staphylococcal Scalded Skin Syndrome, Stargardt's Disease, Startle Disease, Status
 Epilepticus, Steele-Richardson-Olszewski Syndrome, Steely Hair Disease, Stein-Leventhal
 25 Syndrome, Steinert Disease, Stengel's Syndrome, Stengel-Batten-Mayou-Spielmeyer-
 Vogt-Stock Disease, Stenosing Cholangitis, Stenosis of the Lumbar Vertebral Canal,
 Stenosis, Steroid Sulfatase Deficiency, Stevanovic's Ectodermal Dysplasias, Stevens
 Johnson Syndrome, STGD, Stickler Syndrome, Stiff-Man Syndrome, Stiff Person
 Syndrome, Still's Disease, Stilling-Turk-Duane Syndrome, Stillis Disease, Stimulus-
 30 Sensitive Myoclonus, Stone Man Syndrome, Stone Man, Streeter Anomaly, Striatonigral
 Degeneration Autosomal Dominant Type, Striopallidodentate Calcinosis, Stroma,

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Descemet's Membrane, Stromal Corneal Dystrophy, Struma Lymphomatosa, Sturge-
 Kalischer-Weber Syndrome, Sturge Weber Syndrome, Sturge-Weber Phakomatosis,
 Subacute Necrotizing Encephalomyelopathy, Subacute Spongiform Encephalopathy,
 Subacute Necrotizing Encephalopathy, Subacute Sarcoidosis, Subacute Neuronopathic,
 5 Subaortic Stenosis, Subcortical Arteriosclerotic Encephalopathy, Subendocardial Sclerosis,
 Succinylcholine Sensitivity, Sucrase-Isomaltase Deficiency Congenital, Sucrose-
 Isomaltose Malabsorption Congenital, Sucrose Intolerance Congenital, Sudanophilic
 Leukodystrophy ADL, Sudanophilic Leukodystrophy Pelizaeus-Merzbacher Type,
 Sudanophilic Leukodystrophy Included, Sudden Infant Death Syndrome, Sudeck's
 10 Atrophy, Sugio-Kajii Syndrome, Summerskill Syndrome, Summit Acrocephalosyndactyly,
 Summitt's Acrocephalosyndactyly, Summitt Syndrome, Superior Oblique Tendon Sheath
 Syndrome, Suprarenal glands, Supravalvular Aortic Stenosis, Supraventricular tachycardia,
 Surdicardiac Syndrome, Surdocardiac Syndrome, SVT, Sweat Gland Abscess, Sweating
 Gustatory Syndrome, Sweet Syndrome, Swiss Cheese Cartilage Syndrome, Syndactylic
 15 Oxycephaly, Syndactyly Type I with Microcephaly and Mental Retardation, Syndromatic
 Hepatic Ductular Hypoplasia, Syringomyelia, Systemic Aleukemic Reticuloendotheliosis,
 Systemic Amyloidosis, Systemic Carnitine Deficiency, Systemic Elastorrhexis, Systemic
 Lupus Erythematosus, Systemic Mast Cell Disease, Systemic Mastocytosis, Systemic-
 Onset Juvenile Arthritis, Systemic Sclerosis, Systopic Spleen, T-Lymphocyte Deficiency,
 20 Tachyalimentation Hypoglycemia, Tachycardia, Takahara syndrome, Takayasu Disease,
 Takayasu Arteritis, Talipes Calcaneus, Talipes Equinovarus, Talipes Equinus, Talipes
 Varus, Talipes Valgus, Tandem Spinal Stenosis, Tangier Disease, Tapetoretinal
 Degeneration, TAR Syndrome, Tardive Dystonia, Tardive Muscular Dystrophy, Tardive
 Dyskinesia, Tardive Oral Dyskinesia, Tardive Dystonia, Tardy Ulnar Palsy, Target Cell
 25 Anemia, Tarsomegaly, Tarui Disease, TAS Midline Defects Included, TAS Midline
 Defect, Tay Sachs Sphingolipidosis, Tay Sachs Disease, Tay Syndrome Ichthyosis, Tay
 Sachs Sphingolipidosis, Tay Syndrome Ichthyosis, Taybi Syndrome Type I, Taybi
 Syndrome, TCD, TCOF1, TCS, TD, TDO Syndrome, TDO-I, TDO-II, TDO-III,
 Telangiectasis, Telecanthus with Associated Abnormalities, Telecanthus-Hypospadias
 30 Syndrome, Temporal Lobe Epilepsy, Temporal Arteritis/Giant Cell Arteritis, Temporal
 Arteritis, TEN, Tendon Sheath Adherence Superior Obliqu, Tension Myalgia, Terminal

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Deletion of 4q Included, Terrian Corneal Dystrophy, Teschler-Nicola/Killian Syndrome, Tethered Spinal Cord Syndrome, Tethered Cord Malformation Sequence, Tethered Cord Syndrome, Tethered Cervical Spinal Cord Syndrome, Tetrahydrobiopterin Deficiencies, Tetrahydrobiopterin Deficiencies, Tetralogy of Fallot, Tetraphocomelia-Thrombocytopenia

5 Syndrome, Tetrasomy Short Arm of Chromosome 9, Tetrasomy 9p, Tetrasomy Short Arm of Chromosome 18, Thalamic Syndrome, Thalamic Pain Syndrome, Thalamic Hyperesthetic Anesthesia, Thalassemia Intermedia, Thalassemia Minor, Thalassemia Major, Thiamine Deficiency, Thiamine-Responsive Maple Syrup Urine Disease, Thin-Basement-Membrane Nephropathy, Thiolas deficiency, RCDP, Acyl-CoA

10 dihydroxyacetonephosphate acyltransferase, Third and Fourth Pharyngeal Pouch Syndrome, Third Degree Congenital (Complete) Heart Block, Thomsen Disease, Thoracic-Pelvic-Phalangeal Dystrophy, Thoracic Spinal Canal, Thoracoabdominal Syndrome, Thoracoabdominal Ectopia Cordis Syndrome, Three M Syndrome, Three-M Slender-Boned Nanism, Thrombasthenia of Glanzmann and Naegeli, Thrombocythemia Essential,

15 Thrombocytopenia-Absent Radius Syndrome, Thrombocytopenia-Hemangioma Syndrome, Thrombocytopenia-Absent Radii Syndrome, Thrombophilia Hereditary Due to AT III, Thrombotic Thrombocytopenic Purpura, Thromboulcerative Colitis, Thymic Dysplasia with Normal Immunoglobulins, Thymic Agenesis, Thymic Aplasia DiGeorge Type, Thymic Hypoplasia Agammaglobulinemias Primary Included, Thymic Hypoplasia

20 DiGeorge Type, Thymus Congenital Aplasia, Tic Douloureux, Tics, Tinel's syndrome, Tolosa Hunt Syndrome, Tonic Spasmodic Torticollis, Tonic Pupil Syndrome, Tooth and Nail Syndrome, Torch Infection, TORCH Syndrome, Torsion Dystonia, Torticollis, Total Lipodystrophy, Total anomalous pulmonary venous connection, Touraine's Aphthosis, Tourette Syndrome, Tourette's disorder, Townes-Brocks Syndrome, Townes Syndrome,

25 Toxic Paralytic Anemia, Toxic Epidermal Necrolysis, Toxopachyosteose Diaphysaire Tibio-Peroniere, Toxopachyosteose, Toxoplasmosis Other Agents Rubella Cytomegalovirus Herpes Simplex, Tracheoesophageal Fistula with or without Esophageal Atresia, Tracheoesophageal Fistula, Transient neonatal myasthenia gravis, Transitional Atrioventricular Septal Defect, Transposition of the great arteries, Transtelephonic

30 Monitoring, Transthyretin Methionine-30 Amyloidosis (Type I), Trapezoidocephaly-Multiple Synostosis Syndrome, Treacher Collins Syndrome, Treacher Collins-

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Franceschetti Syndrome 1, Trevor Disease, Triatrial Heart, Tricho-Dento-Osseous Syndrome, Trichodento Osseous Syndrome, Trichopoliodystrophy, Trichorhinophalangeal Syndrome, Trichorhinophalangeal Syndrome, Tricuspid atresia, Trifunctional Protein Deficiency, Trigeminal Neuralgia, Triglyceride Storage Disease Impaired Long-Chain
 5 Fatty Acid Oxidation, Trigonitis, Trigonocephaly, Trigonocephaly Syndrome, Trigonocephaly "C" Syndrome, Trimethylaminuria, Triphalangeal Thumbs-Hypoplastic Distal Phalanges-Onychodystrophy, Triphalangeal Thumb Syndrome, Triple Symptom Complex of Behcet, Triple X Syndrome, Triplo X Syndrome, Triploid Syndrome, Triploidy, Triploidy Syndrome, Trismus-Pseudocamptodactyly Syndrome, Trisomy,
 10 Trisomy G Syndrome, Trisomy X, Trisomy 6q Partial, Trisomy 6q Syndrome Partial, Trisomy 9 Mosaic, Trisomy 9P Syndrome (Partial) Included, Trisomy 11q Partial, Trisomy 14 Mosaic, Trisomy 14 Mosaicism Syndrome, Trisomy 21 Syndrome, Trisomy 22 Mosaic, Trisomy 22 Mosaicism Syndrome, TRPS, TRPS1, TRPS2, TRPS3, True Hermaphroditism, Truncus arteriosus, Tryptophan Malabsorption, Tryptophan Pyrrolase
 15 Deficiency, TS, TTP, TTTS, Tuberous Sclerosis, Tubular Ectasia, Turcot Syndrome, Turner Syndrome, Turner-Kieser Syndrome, Turner Phenotype with Normal Chromosomes (Karyotype), Turner-Varny Syndrome, Turricephaly, Twin-Twin Transfusion Syndrome, Twin-to-Twin Transfusion Syndrome, Type A, Type B, Type AB, Type O, Type I Diabetes, Type I Familial Incomplete Male, Type I Familial Incomplete
 20 Male Pseudohermaphroditism, Type I Gaucher Disease, Type I (PCCA Deficiency), Type I Tyrosinemia, Type II Gaucher Disease, Type II Histiocytosis, Type II (PCCB Deficiency), Type II Tyrosinemia, Type IIA Distal Arthrogryposis Multiplex Congenita, Type III Gaucher Disease, Type III Tyrosinemia, Type III Dentinogenesis Imperfecta, Typical Retinoschisis, Tyrosinase Negative Albinism (Type I), Tyrosinase Positive
 25 Albinism (Type II), Tyrosinemia type 1 acute form, Tyrosinemia type 1 chronic form, Tyrosinosis, UCE, Ulcerative Colitis, Ulcerative Colitis Chronic Non-Specific, Ulnar-Mammary Syndrome, Ulnar-Mammary Syndrome of Pallister, Ulnar Nerve Palsy, UMS, Unclassified FODs, Unconjugated Benign Bilirubinemia, Underactivity of Parathyroid, Unilateral Ichthyosiform Erythroderma with Ipsilateral Malformations Limb, Unilateral
 30 Chondromatosis, Unilateral Defect of Pectoralis Muscle and Syndactyly of the Hand, Unilateral Hemidysplasia Type, Unilateral Megalencephaly, Unilateral Partial

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Lipodystrophy, Unilateral Renal Agenesis, Unstable Colon, Unverricht Disease,
 Unverricht-Lundborg Disease, Unverricht-Lundborg-Laf Disease, Unverricht Syndrome,
 Upper Limb - Cardiovascular Syndrome (Holt-Oram), Upper Motor Neuron Disease,
 Upper Airway Apnea, Urea Cycle Defects or Disorders, Urea Cycle Disorder Arginase
 5 Type, Urea Cycle Disorder Arginino Succinase Type, Urea Cycle Disorders Carbamyl
 Phosphate Synthetase Type, Urea Cycle Disorder Citrullinemia Type, Urea Cycle
 Disorders N-Acetyl Glutamate Synthetase Typ, Urea Cycle Disorder OTC Type, Urethral
 Syndrome, Urethro-Oculo-Articular Syndrome, Uridine Diphosphate
 Glucuronosyltransferase Severe Def. Type I, Urinary Tract Defects, Urofacial Syndrome,
 10 Uroporphyrinogen III cosynthase, Urticaria pigmentosa, Usher Syndrome, Usher Type I,
 Usher Type II, Usher Type III, Usher Type IV, Uterine Synechiae, Uroporphyrinogen I-
 synthase, Uveitis, Uveomeningitis Syndrome, V-CJD, VACTERL Association, VACTERL
 Association, VACTERL Syndrome, Valgus Calcaneus, Valine Transaminase Deficiency,
 Valinemia, Valproic Acid, Valproate acid exposure, Valproic acid exposure, Valproic acid,
 15 Van Buren's Disease, Van der Hoeve-Habertsma-Waardenburg-Gauldi Syndrome,
 Variable Onset Immunoglobulin Deficiency Dysgammaglobulinemia, Variant Creutzfeldt-
 Jakob Disease (V-CJD), Varicella Embryopathy, Variegate Porphyria, Vascular
 Birthmarks, Vascular Dementia Binswanger's Type, Vascular Erectile Tumor, Vascular
 Hemophilia, Vascular Malformations, Vascular Malformations of the Brain, Vasculitis,
 20 Vasomotor Ataxia, Vasopressin-Resistant Diabetes Insipidus, Vasopressin-Sensitive
 Diabetes Insipidus, VATER Association, Vcf syndrome, Vcfs, Velocardiofacial Syndrome,
 VeloCardioFacial Syndrome, Venereal Arthritis, Venous Malformations, Ventricular
 Fibrillation, Ventricular Septal Defects, Congenital Ventricular Defects, Ventricular Septal
 Defect, Ventricular Tachycardia, Venual Malformations, VEOHD, Vermis Aplasia,
 25 Vermis Cerebellar Agenesis, Vernal Keratoconjunctivitis, Verruca, Vertebral Anal
 Tracheoesophageal Esophageal Radial, Vertebral Ankylosing Hyperostosis, Very Early
 Onset Huntington's Disease, Very Long Chain Acyl-CoA Dehydrogenase (VLCAD)
 Deficiency, Vestibular Schwannoma, Vestibular Schwannoma Neurofibromatosis,
 Vestibulocerebellar, Virchow's Oxycephaly, Visceral Xanthogranulomatosis, Visceral
 30 Xantho-Granulomatosis, Visceral myopathy-External Ophthalmoplegia, Visceromegaly-
 Umbilical Hernia-Macroglossia Syndrome, Visual Amnesia, Vitamin A Deficiency,

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Vitamin B-1 Deficiency, Vitelline Macular Dystrophy, Vitiligo, Vitiligo Capitis, Vitreoretinal Dystrophy, VKC, VKH Syndrome, VLCAD, Vogt Syndrome, Vogt Cephalosyndactyly, Vogt Koyanagi Harada Syndrome, Von Bechterew-Strumpell Syndrome, Von Eulenburg Paramyotonia Congenita, Von Frey's Syndrome, Von Gierke Disease, Von Hippel-Lindau Syndrome, Von Mikulicz Syndrome, Von Recklinghausen Disease, Von Willebrandt Disease, VP, Vrolik Disease (Type II), VSD, Vulgaris Type Disorder of Cornification, Vulgaris Type Ichthyosis, W Syndrome, Waardenburg Syndrome, Waardenburg-Klein Syndrome, Waardenburg Syndrome Type I (WS1), Waardenburg Syndrome Type II (WS2), Waardenburg Syndrome Type IIA (WS2A),
10 Waardenburg Syndrome Type IIB (WS2B), Waardenburg Syndrome Type III (WS3), Waardenburg Syndrome Type IV (WS4), Waelsch's Syndrome, WAGR Complex, WAGR Syndrome, Waldenstroem's Macroglobulinemia, Waldenstrom's Purpura, Waldenstrom's Syndrome, Waldmann Disease, Walker-Warburg Syndrome, Wandering Spleen, Warburg Syndrome, Warm Antibody Hemolytic Anemia, Warm Reacting Antibody Disease,
15 Wartenberg Syndrome, WAS, Water on the Brain, Watson Syndrome, Watson-Alagille Syndrome, Waterhouse-Friderichsen syndrome, Waxy Disease, WBS, Weaver Syndrome, Weaver-Smith Syndrome, Weber-Cockayne Disease, Wegener's Granulomatosis, Weil Disease, Weil Syndrome, Weill-Marchesani, Weill-Marchesani Syndrome, Weill-Reyes Syndrome, Weismann-Netter-Stuhl Syndrome, Weissenbacher-Zweymuller Syndrome,
20 Wells Syndrome, Wenckebach, Werdnig-Hoffman Disease, Werdnig-Hoffman Paralysis, Werlhof's Disease, Werner Syndrome, Wernicke's (C) I Syndrome, Wernicke's aphasia, Wernicke-Korsakoff Syndrome, West Syndrome, Wet Beriberi, WHCR, Whipple's Disease, Whipple Disease, Whistling face syndrome, Whistling Face-Windmill Vane Hand Syndrome, White-Darier Disease, Whitnall-Norman Syndrome, Whorled nevoid
25 hypermelanosis, WHS, Wieacker Syndrome, Wieacker Syndrome, Wieacker-Wolff Syndrome, Wiedmann-Beckwith Syndrome, Wiedemann-Rautenstrauch Syndrome, Wildervanck Syndrome, Willebrand-Juergens Disease, Willi-Prader Syndrome, Williams Syndrome, Williams-Beuren Syndrome, Wilms' Tumor, Wilms' Tumor-Aniridia-Gonadoblastoma-Mental Retardation Syndrome, Wilms Tumor Aniridia Gonadoblastoma
30 Mental Retardation, Wilms' Tumor-Aniridia-Genitourinary Anomalies-Mental Retardation Syndrome, Wilms Tumor-Pseudohermaphroditism-Nephropathy, Wilms Tumor and

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Pseudohermaphroditism, Wilms Tumor-Pseudohermaphroditism-Glomerulopathy,
 Wilson's Disease, Winchester Syndrome, Winchester-Grossman Syndrome, Wiskott-
 Aldrich Syndrome, Wiskott-Aldrich Type Immunodeficiency, Witkop Ectodermal
 Dysplasias, Witkop Tooth-Nail Syndrome, Wittmaack-Ekbom Syndrome, WM Syndrome,
 5 WMS, WNS, Wohlfart-Disease, Wohlfart-Kugelberg-Welander Disease, Wolf Syndrome,
 Wolf-Hirschhorn Chromosome Region (WHCR), Wolf-Hirschhorn Syndrome, Wolff-
 Parkinson-White Syndrome, Wolfram Syndrome, Wolman Disease (Lysosomal Acid Lypase
 Deficiency), Woody Guthrie's Disease, WPW Syndrome, Writer's Cramp, WS, WSS,
 WWS, Wyburn-Mason Syndrome, X-Linked Addison's Disease, X-linked
 10 Adrenoleukodystrophy (X-ALD), X-linked Adult Onset Spinobulbar Muscular Atrophy,
 X-linked Adult Spinal Muscular Atrophy, X-Linked Agammaglobulinemia with Growth
 Hormone Deficiency, X-Linked Agammaglobulinemia, Lymphoproliferate X-Linked
 Syndrome, X-linked Cardio myopathy and Neutropenia, X-Linked Centronuclear
 myopathy, X-linked Copper Deficiency, X-linked Copper Malabsorption, X-Linked
 15 Dominant Conradi-Hunermann Syndrome, X-Linked Dominant Inheritance Agenesis of
 Corpus Callosum, X-Linked Dystonia-parkinsonism, X Linked Ichthyosis, X-Linked
 Infantile Agammaglobulinemia, X-Linked Infantile Nectrotizing Encephalopathy, X-
 linked Juvenile Retinoschisis, X-linked Lissencephaly, X-linked Lymphoproliferative
 Syndrome, X-linked Mental Retardation-Clasped Thumb Syndrome, X-Linked Mental
 20 Retardation with Hypotonia, X-linked Mental Retardation and Macroorchidism, X-Linked
 Progressive Combined Variable Immunodeficiency, X-Linked Recessive Conradi-
 Hunermann Syndrome, X-Linked Recessive Severe Combined Immunodeficiency, X-
 Linked Retinoschisis, X-linked Spondyloepiphyseal Dysplasia, Xanthine Oxidase
 Deficiency (Xanthinuria Deficiency, Hereditary), Xanthinuria Deficiency, Hereditary
 25 (Xanthine Oxidase Deficiency), Xanthogranulomatosis Generalized, Xanthoma
 Tuberosum, Xeroderma Pigmentosum, Xeroderma Pigmentosum Dominant Type,
 Xeroderma Pigmentosum Type A I XPA Classical Form, Xeroderma Pigmentosum Type
 B II XPB, Xeroderma Pigmentosum Type E V XPE, Xeroderma Pigmentosum Type C III
 XPC, Xeroderma Pigmentosum Type D IV XPD, Xeroderma Pigmentosum Type F VI
 30 XPF, Xeroderma Pigmentosum Type G VII XPG, Xeroderma Pigmentosum Variant Type
 XP-V, Xeroderma-Talipes-and Enamel Defect, Xerodermic Idiocy, Xerophthalmia,

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Xerotic Keratitis, XLP, XO Syndrome, XP, XX Male Syndrome, Sex Reversal, XXXXX Syndrome, XXY Syndrome, XYY Syndrome, XYY Chromosome Pattern, Yellow Mutant Albinism, Yellow Nail Syndrome, YKL, Young Female Arteritis, Yunis-Varon Syndrome, YY Syndrome, Z-E Syndrome, Z- and -Protease Inhibitor Deficiency, Zellweger
 5 Syndrome, Zellweger cerebro-hepato-renal syndrome, ZES, Ziehen-Oppenheim Disease (Torsion Dystonia), Zimmermann-Laband Syndrome, Zinc Deficiency Congenital, Zinsser-Cole-Engman Syndrome, ZLS, Zollinger-Ellison Syndrome.

As used herein a "cancer" refers to a group of diseases and disorders that are characterized
 10 by uncontrolled cellular growth (e.g. formation of tumor) without any differentiation of those cells into specialized and different cells. Cancers which can be treated using the methods of the present invention include, without being limited to, ABL1 protooncogene, AIDS Related Cancers, Acoustic Neuroma, Acute Lymphocytic Leukaemia, Acute Myeloid Leukaemia, Adenocystic carcinoma, Adrenocortical Cancer, Agnogenic myeloid
 15 metaplasia, Alopecia, Alveolar soft-part sarcoma, Anal cancer, Angiosarcoma, Aplastic Anaemia, Astrocytoma, Ataxia-telangiectasia, Basal Cell Carcinoma (Skin), Bladder Cancer, Bone Cancers, Bowel cancer, Brain Stem Glioma, Brain and CNS Tumours, Breast Cancer, CNS tumours, Carcinoid Tumours, Cervical Cancer, Childhood Brain Tumours, Childhood Cancer, Childhood Leukaemia, Childhood Soft Tissue Sarcoma, Chondrosarcoma, Choriocarcinoma, Chronic Lymphocytic Leukaemia, Chronic Myeloid
 20 Leukaemia, Colorectal Cancers, Cutaneous T-Cell Lymphoma, Dermatofibrosarcoma-protuberans, Desmoplastic-Small-Round-Cell-Tumour, Ductal Carcinoma, Endocrine Cancers, Endometrial Cancer, Ependymoma, Esophageal Cancer, Ewing's Sarcoma, Extra-Hepatic Bile Duct Cancer, Eye Cancer, Eye: Melanoma, Retinoblastoma, Fallopian Tube
 25 cancer, Fanconi Anaemia, Fibrosarcoma, Gall Bladder Cancer, Gastric Cancer, Gastrointestinal Cancers, Gastrointestinal-Carcinoid-Tumour, Genitourinary Cancers, Germ Cell Tumours, Gestational-Trophoblastic-Disease, Glioma, Gynaecological Cancers, Haematological Malignancies, Hairy Cell Leukaemia, Head and Neck Cancer, Hepatocellular Cancer, Hereditary Breast Cancer, Histiocytosis, Hodgkin's Disease,
 30 Human Papillomavirus, Hydatidiform mole, Hypercalcemia, Hypopharynx Cancer, IntraOcular Melanoma, Islet cell cancer, Kaposi's sarcoma, Kidney Cancer, Langerhan's-

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Cell-Histiocytosis, Laryngeal Cancer, Leiomyosarcoma, Leukaemia, Li-Fraumeni Syndrome, Lip Cancer, Liposarcoma, Liver Cancer, Lung Cancer, Lymphedema, Lymphoma, Hodgkin's Lymphoma, Non-Hodgkin's Lymphoma, Male Breast Cancer, Malignant-Rhabdoid-Tumour-of-Kidney, Medulloblastoma, Melanoma, Merkel Cell
 5 Cancer, Mesothelioma, Metastatic Cancer, Mouth Cancer, Multiple Endocrine Neoplasia, Mycosis Fungoides, Myelodysplastic Syndromes, Myeloma, Myeloproliferative Disorders, Nasal Cancer, Nasopharyngeal Cancer, Nephroblastoma, Neuroblastoma, Neurofibromatosis, Nijmegen Breakage Syndrome, Non-Melanoma Skin Cancer, Non-Small-Cell-Lung-Cancer-(NSCLC), Ocular Cancers, Oesophageal Cancer, Oral cavity
 10 Cancer, Oropharynx Cancer, Osteosarcoma, Ostomy Ovarian Cancer, Pancreas Cancer, Paranasal Cancer, Parathyroid Cancer, Parotid Gland Cancer, Penile Cancer, Peripheral-Neuroectodermal-Tumours, Pituitary Cancer, Polycythemia vera, Prostate Cancer, Rare-cancers-and-associated-disorders, Renal Cell Carcinoma, Retinoblastoma, Rhabdomyosarcoma, Rothmund-Thomson Syndrome, Salivary Gland Cancer, Sarcoma,
 15 Schwannoma, Sezary syndrome, Skin Cancer, Small Cell Lung Cancer (SCLC), Small Intestine Cancer, Soft Tissue Sarcoma, Spinal Cord Tumours, Squamous-Cell-Carcinoma-(skin), Stomach Cancer, Synovial sarcoma, Testicular Cancer, Thymus Cancer, Thyroid Cancer, Transitional-Cell-Cancer-(bladder), Transitional-Cell-Cancer-(renal-pelvis/-ureter), Trophoblastic Cancer, Urethral Cancer, Urinary System Cancer, Uroplakins,
 20 Uterine sarcoma, Uterus Cancer, Vaginal Cancer, Vulva Cancer, Waldenstrom's-Macroglobulinemia, Wilms' Tumour.

In any or all of the conditions listed above, an immune response may be provoked or the immune response may exacerbate the symptoms. This may result in (or from) a change in
 25 levels of one of the five sub-populations of CD4⁺ T-cells.

The identification of sub-populations of CD4⁺ T-cells also enables the development of agents which specifically target and either promote their activity or diminish their activity including selectively inducing cell apoptosis. In addition, differential expression analysis
 30 may be used to identify a unique surface marker to facilitate directed therapy (e.g. apoptosis) of the T-cells. In one example, agents specifically targeting surface molecules

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to induce a particular response or to inhibit a response or to induce apoptosis may be developed.

The present invention provides, therefore, a compound, agent, medicament or drug which
5 modulates the activity or viability of a sub-population of CD4⁺ T-cells selected from:

CMRF-35⁺⁺ CD45RO⁺;
CMRF-35⁺ CD45RO⁺;
CMRF-35⁻ CD45RO⁺;
10 CMRF-35⁺ CD45RO⁻; and
CMRF-35⁻ CD45RO⁻ T-cells.

Unless otherwise indicated, the subject invention is not limited to specific formulations of components, manufacturing methods, dosage regimes, or the like, as such may vary. The
15 terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting.

The singular forms “a”, “an” and “the” include plural aspects unless the context clearly dictates otherwise. Thus, for example, reference to an agent includes a single agent, as well
20 as two or more agents. Similarly, a T-cell includes a single T-cell or two or more T-cells.

The terms “compound”, “active agent”, “chemical agent”, “pharmacologically active agent”, “medicament”, “active” and “drug” are used interchangeably herein to refer to a chemical or biological compound that induces a desired physiological effect such as
25 modulating the levels or activities of the subject sub-populations of CD4⁺ T-cells. The terms also encompass pharmaceutically acceptable and pharmacologically active ingredients of those active agents specifically mentioned herein including but not limited to salts, esters, amides, prodrugs, active metabolites, analogs and the like. When the terms “compound”, “active agent”, “chemical agent” “pharmacologically active agent”,
30 “medicament”, “active” and “drug” are used, then it is to be understood that this includes the active agent *per se* as well as pharmaceutically acceptable, pharmacologically active

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salts, esters, amides, prodrugs, metabolites, analogs, etc.

Reference to a "compound", "active agent", "chemical agent" "pharmacologically active agent", "medicament", "active" and "drug" includes combinations of two or more actives.

- 5 A "combination" also includes multi-part such as a two-part composition where the agents are provided separately and given or dispensed separately or admixed together prior to dispensation.

- For example, a multi-part pharmaceutical pack may have two or more antibodies or CD
10 ligands maintained separately.

- The terms "effective amount" and "therapeutically effective amount" of an agent as used herein mean a sufficient amount of the agent to provide the desired therapeutic or physiological effect or outcome in relation to the particular CD4⁺ T-cell sub-population.
15 Undesirable effects, e.g. side effects, are sometimes manifested along with the desired therapeutic effect; hence, a practitioner balances the potential benefits against the potential risks in determining what is an appropriate "effective amount". The exact amount required will vary from subject to subject, depending on the species, age and general condition of the subject, mode of administration and the like. Thus, it may not be possible to specify an
20 exact "effective amount". However, an appropriate "effective amount" in any individual case may be determined by one of ordinary skill in the art using only routine experimentation.

- By "pharmaceutically acceptable" carrier, excipient or diluent is meant a pharmaceutical
25 vehicle comprised of a material that is not biologically or otherwise undesirable, i.e. the material may be administered to a subject along with the selected active agent without causing any or a substantial adverse reaction. Carriers may include excipients and other additives such as diluents, detergents, coloring agents, wetting or emulsifying agents, pH buffering agents, preservatives, and the like.

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Similarly, a "pharmacologically acceptable" salt, ester, emide, prodrug or derivative of a compound as provided herein is a salt, ester, amide, prodrug or derivative that this not biologically or otherwise undesirable.

- 5 The terms "treating" and "treatment" as used herein refer to reduction in severity and/or frequency of symptoms of the condition being treated, elimination of symptoms and/or underlying cause, prevention of the occurrence of symptoms of the condition and/or their underlying cause and improvement or remediation or amelioration of damage following a condition.

10

"Treating" a subject may involve prevention of a condition or other adverse physiological event in a susceptible individual as well as treatment of a clinically symptomatic individual by ameliorating the symptoms of the condition.

- 15 A "subject" as used herein refers to an animal, preferably a mammal and more preferably human who can benefit from the pharmaceutical formulations and methods of the present invention. There is no limitation on the type of animal that could benefit from the presently described pharmaceutical formulations and methods. A subject regardless of whether a human or non-human animal may be referred to as an individual, patient, animal, host or
20 recipient. The compounds and methods of the present invention have applications in human medicine, veterinary medicine as well as in general, domestic or wild animal husbandry. The compositions also have industrial applications.

- As indicated above, the preferred animals are humans or other primates such as
25 orangutangs, gorillas, marmosets, livestock animals, laboratory test animals, companion animals or captive wild animals, as well as avian species.

- Examples of laboratory test animals include mice, rats, rabbits, guinea pigs and hamsters. Rabbits and rodent animals, such as rats and mice, provide a convenient test system or
30 animal model. Livestock animals include sheep, cows, pigs, goats, horses and donkeys. Non-mammalian animals such as avian species, zebrafish, and amphibians including

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Xenopus spp.

Any immunological condition may be treated or the symptoms ameliorated using the selective targeting according to the present invention.

5

In addition, immunological tolerance or non-responsiveness may be induced in a subject's specific CD4⁺ T-cell sub-population *in vitro* and the modified cells retransferred to the subject.

Alternatively, two monovalent antibodies each conjugated to a portion of a cytotoxic molecule or T-cell effector ligand and which are directed, for example to CMRF-35 epitope and CD45RO may be administered. In CMRF-35^{+/++} CD45RO⁺ cells, for instance, the monovalent antibodies will bind and the fluidity of the T-cell membrane will permit the two antibodies to come together with the acid, for example, of a leucine zipper. Once together, the cytotoxic molecule or T-cell effective ligand is reconstructed and will have its effect.

10
15

The present invention is further described by the following non-limiting Examples.

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EXAMPLE 1

Monoclonal antibodies

5 The CMRF-35 mAb is described by Daish *et al*, 1993 *Supra*. Directly PE, FITC, PerCP or APC conjugated antibodies for CD3, CD19, CD14, CD34, HLA-DR, CD62L, CD49d, CD25, CD4, CD45RO, IgG1 controls were obtained from BD Biosciences (San Jose, CA). CD56-PE, CD28-PE and CD38-Pe were obtained from BD Pharmingen. CXCR3-FITC and CCR7-FITC were obtained from R&D Systems (UK). Sheep anti mouse-PE and FITC
10 conjugates were obtained from Chemicon (Melbourne).

EXAMPLE 2

Preparation of resting peripheral T lymphocytes

15 Peripheral blood mononuclear cells (PBMC) were prepared from buffy coats from normal healthy donors supplied by the Australian Red Cross Service (Brisbane, Australia) by density gradient centrifugation over Ficoll-Paque Plus (Pharmacia, Uppsala, Sweden). To enrich for the T lymphocyte fraction, PBMC were incubated with neuraminidase-treated sheep red blood cells. Rosette containing T cells (ER⁺) and the non-rosetting (ER⁻)
20 fractions were separated by Ficoll density centrifugation. The T cells were collected from the ER⁺ fraction following lysis of the sheep red blood cells with 0.15M NH₄Cl.

For functional studies CD4⁺ T lymphocytes were purified by negative selectin on a FACS Vantage (BD Biosciences). The ER⁺ cell fraction was abeled with CMRF-35 mAb and
25 SAM-PE, followed by CD8-FITC, CD14-FITC, CD19-FITC, CD56-FITC, CD11b-FITC, CD34-FITC and HLA-DR-FOTC mAbs. For individual experiments alternative fluor

Cord blood samples were obtained with ethical consent from healthy donors through the Mater Mothers Hospital. Mononuclear cells were prepared by density gradient
30 centrifugation over Ficoll-Paque Plus as above.

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EXAMPLE 3

Phenotyping of T lymphocytes

T lymphocytes were phenotyped by multi-color fluorescence using a combination of
5 directly labeled antibodies. PBMC were labeled either with CMRF-35 mAb followed by
SAM-FITC or SAM-PE, blocked with 10% v/v normal mouse serum, and then incubated
simultaneously with directly labeled antibodies or simultaneously with CD4-PerCP,
CD45RO-APC and the relevant PE labeled mAb. Labeled cells were analysed on a FACS
Calibur (BD Biosciences). CD4⁺ lymphocytes were gated on forward/side scatter and
10 CD4-PerCP. The proportion of CMRF-35^{+/+} cells in the different populations analysed
using FCS express software. Phenotyping was performed on nine normal donors.

For functional studies, CD4⁺ T lymphocytes were purified by negative selection on a
FACS Vantage (BD Biosciences). The ER⁺ cell fraction was labeled with CMRF-35 mAb
15 and SAM-PE, followed by CD8-FITC, CD14-FITC, CD19-FITC, CD56-FITC, CD11b-
FITC, CD34-FITC and HLA-DR-FITC mAbs. For individual experiments alternative
fluorochromes were used.

EXAMPLE 4

20 Allogeneic Mixed Lueococyte reactions (MLR)

Lin⁻ HLA-DR⁺ dendritic cells (DC) were purified from the ER⁻ fraction of the PBMCs
using magnetic bead immunodepletion followed by negative selection on the FACS
Vantage. ER⁻ cells were labeled with CD14 (CMRF-31), CD19, CD56, CD34. Following
25 washing, the cells were incubated with Biomag goat anti-mouse-immunoglobulin-coated
magnetic beads (Polysciences Warrington, PA, USA). Labeled cells were depleted by
first pre-clearing with a MCP-1 magnet (Dynal, Oslo, Norway) followed by passing
through a MACS CS column on a Variomacs magnet (Miltenyi Biotech, Gladbach,
Germany). To obtain highly purified DC, the immunodepleted cellswere labeled with
30 CD64-PE, CD20-PE, CD11b-PE and HLA-DR-APC. The cells were sorted by the FACS
Vantage and the HLA-DR⁺,Lin⁻ population collected.

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Allogeneic MLRs were established using various numbers of each of the Lin⁻ subsets cultured in triplicate in round-bottom 96-well tissue culture plates (Costar) with 10⁵ freshly isolated allogeneic T cells, in RPMI1640 supplemented with 10% v/v FCS and 100U/ml penicillin, 100 µg/ml streptomycin, and 2 mM glutamine (Invitrogen) at 37°C in 5% CO₂ for 5 days. T cell proliferation was measured by the uptake of [³H]-thymidine (1µCi/well; 6.7 Ci/mM, Amersham, UK), which was added 18 hours prior to harvesting. Cells were harvested onto glass fibre filter paper with an automated 96 well harvester (TomTec Mach III, Hamden, CT) and [³H]-thymidine incorporation measured by liquid scintillation spectroscopy (Wallac, Finland). The responses are reported as the mean cpm ± SEM for triplicate wells. Values of $p < 0.05$ were considered statistically significant.

EXAMPLE 5

Proliferation Assay

For PMA/ionomycin stimulation of resting T lymphocytes, 2 X 10⁵ purified cells per well were incubated in 96-well round bottom microtiter plates in 200µl of RPMI supplemented with 10% v/v FCS and 100U/ml penicillin, 100 µg/ml streptomycin, and 2 mM glutamine (Invitrogen). T lymphocytes were stimulated either with PMA and ionomycin or in the presence of immobilised CD3 and CD28 [Geppert and Lipsky]. CD3 and CD28 mAb were immobilised by incubating 100µl of 10ug/ml CD3 and 10ug/ml CD28 antibodies in 96 well plates overnight at 4°C. The following day the mAb were washed out with media prior to addition of cells. After 6 days at 37°C/5% v/v CO₂, cell proliferation was assessed by [³H]thymidine uptake (1µCi/well added for 16h; Amersham, UK). A paired student's *t* test was used for statistical analysis of differences in cell proliferation. Alternatively, cells were harvested following 24 hour stimulation for CD3/CD28 mediated stimulation or 48 hours following PMA/ionomycin stimulation. Cells were analysed for CD25 and CD69 upregulation, cytokine synthesis, or induction of apoptosis.

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EXAMPLE 6

Intracellular staining for cytokines

Intracellular staining for cytokines was as per the manufacturer's instructions (Fix/Perm Kit, CALTAG LABORATORIES) except for the intracellular labeling incubation step, where samples were incubated at 4°C instead of the recommended room temperature (as per recommendations Pharmingen recommendations for their antibodies). Cells were surface labeled with CD25 using directly conjugated mAb (BD Biosciences). Protein transport was inhibited using Golgi Plug (Trademark; Pharmingen) and stained for intracellular cytokines with IL10-PE, IL4-PE and IFN- γ -FITC or IFN- γ -PE (Pharmingen).

EXAMPLE 7

Isolation of total RNA and cDNA synthesis

Cells were harvested from 96 well plates and total cellular RNA isolated using Trizol reagent (Life Technologies). RNA was re-suspended to 10ul with deionised water and reverse-transcribed into cDNA using oligo-dT primer and super-script reverse transcriptase (Life Technologies). Polymerase chain reaction (PCR) amplification was carried out separately for each cytokine using oligonucleotide primers designed by Kruse *et al.*

EXAMPLE 8

Analysis of IL-2, IL-4, IL-10 and IFN- γ mRNA production by real-time PCR

Days 6 and 2 were determined to be the optimal time points for cell harvest for subsequent analysis of cytokine mRNA in MLR systems and in vitro activated cells respectively. All PCR's were first optimized on a standard block cycler (MJ Research) before transferring to a real-time PCR machine (Corbett Research). PCR cycling conditions on the block cycler were the same for β -actin and all cytokine primer sets used. Initial 10 minute hot-start at 95°C, followed by addition of Taq polymerase (Qiagen) and 40 cycles of 15 second denaturation and 1 minute for annealing and extension at 60°, followed by a final 5 minute extension at 60°C. For real time analysis of mRNA levels Platinum Quantitative PCR

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SuperMix-UDG (Invitrogen) was used with SYBR[®] Green 1 (Concentration of Syber green Sigma). Primers included β -actin sense ATTGCCGAC AGGATGCAGAA (SEQ ID NO:1), β -actin antisense GCTGATCCACATCTGCTGGAA (SEQ ID NO:2), IL-2 sense TAACCTCAAC TCCTGCCACAATGTACA (SEQ ID NO:3), IL-2 antisense
 5 ATGTTGTTTCAGATCCCTTTAGTTCCA GA (SEQ ID NO:4), IL-4 sense TCTCACCTCCCAACTGCTTCCCC (SEQ ID NO:5), IL-4 antisense AGAGGTTCTCTGTCG AGCCGTTTCA (SEQ ID NO:6), IL-10 sense AGGGCACCCAGTCTGAGAACA (SEQ ID NO:7), IL-10 antisense CGGCCTTGC TCTTGTTTTTCAC (SEQ ID NO:8), IFN γ sense TTTTCAGCTCTGCATCGTTTTGGGT
 10 (SEQ ID NO:9), IFN γ antisense CCTTGAAACAGCATCT GACTCCTT (SEQ ID NO:10).

The PCR standards for each cytokine consisted of known numbers of molecules of purified PCR product, prepared as previously described' (cited in Yin *et al*). PCR product was gel
 15 purified by excision of band of correct molecular weight (Gel extraction kit, Qiagen). The concentration was estimated by OD₂₆₀ and the number of copies/mL of standard were calculated according to the following formula: copies/mL = $6.023 \times 10^{23} \times C \times OD_{260}/MWt$ where $C=5 \times 10^{-5}$ g/mL for DNA and $MWt=PCR$ product (base pairs $\times 6.58 \times 10^2$ g). Standards were made to a concentration of 10^8 copies/ul and stored at $-20^\circ C$.

20

EXAMPLE 9

Cell Cycle analysis

Cells were harvested and fixed in 1ml of ice-cold 70% v/v ethanol O/N at $4^\circ C$. The fixed
 25 cells were stained in 1ml propidium iodide (50ug/ml containing 0.5mg/ml RNase A) at room temperature with gentle rocking. Samples were analysed within 24 hr on a FACSCalibur using the ModFit software.

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EXAMPLE 10

Analysis of Apoptosis

Induction of apoptosis was assessed using AnnexinV-EGFP (Clontech). Briefly, 1×10^5 –
5 1×10^6 cells were washed and resuspended in 200 μ l of binding buffer. Cells were stained
with 5 μ l of Annexin V –EGFP and 10 μ l Propidium Iodide, at RT for 5-15 minutes in the
dark. The cells were resuspended in 250 μ l of binding buffer and analysed immediately on
a FACSCalibur.

10

EXAMPLE 11

Phenotype of peripheral blood T lymphocyte defines a new T lymphocyte subset

The CMRF-35 mAb recognizes a sub population of peripheral T lymphocytes that varies
between 76-81.2% (mean, SD) of CD3⁺ cells and binding of the mAb did not correlate
15 with any other well known T lymphocyte populations. Whilst all CD8⁺ lymphocytes were
CMRF-35⁺, CMRF-35 bound to a significant proportion of but not all CD4⁺ subsets i.e.
CD45RA⁺ naïve and CD45RO⁺ memory cells, CD28^{+/−} cells, CD25⁺ regulatory cells as
well as CCR7⁺ cells. Thus, the CMRF-35-CD4⁺ T lymphocyte population appeared to be
a novel phenotypic T lymphocyte subset. CMRF-35 molecules are expressed on the
20 CD28⁺ and CD28[−] populations of T lymphocytes and all CMRF-35[−] T lymphocytes were
CD28⁺. The CMRF-35⁺ and CMRF-35[−] T lymphocyte populations are found within
CD38⁺ T lymphocytes. Whilst 75% of the CD4⁺CD25⁺ T lymphocytes were CMRF-35⁺,
25% of this population lacked CMRF-35 expression.

25 Overall the CMRF-35 mAb identified a CD4⁺ CMRF-35[−] population that ranged from
8.24% to 26.64% of the CD4⁺ population with an average of 21.68% (from n=6). The
CD4⁺ T lymphocytes could be divided into five populations on the basis of
CD45RA/CD45RO and CMRF-35 expression (Figure 1A) subdividing the CMRF-35
population further. The CD4⁺, CD45RA⁺ CMRF-35[−] lymphocytes accounted for 37.16%
30 of the CD4⁺CD45RA⁺ T lymphocytes. The CD4⁺ CD45RO⁺ CMRF-35[−] populations
accounted for 26.75% of the CD4⁺CD45RO⁺ lymphocytes.

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The CD8⁺ depleted T lymphocytes were analysed further by four color labeling. The CD4⁺CD45RO⁺ population contained the functionally distinguished central memory (CCR7⁺CD62L⁺) and effector memory T lymphocytes (CCR7⁺CD62L⁻). CMRF-35
5 molecules were identified on approximately 50% of the CD4⁺CD45RO⁺CCR7⁺ T lymphocytes whilst all CD4⁺CD45RO⁺CCR7⁻ T lymphocytes were CMRF-35⁺ (Figure 1B). Similarly, CMRF-35 was found on 50% of CD4⁺CD45RA⁺CCR7⁺ T lymphocytes. However the CMRF-35⁺ population of cells could be segregated into CMRF-35^{Bright} and CMRF-35^{Dim} populations. CMRF-35^{Bright} cells were present in both the CD4⁺CD45RO⁺
10 and CD45RA⁺ cells and these cells were all CCR7⁻CXCR3⁺CD49d⁺. The CMRF-35^{med} T lymphocytes were present only in the CD4⁺CD45RO⁺ population. CMRF-35^{Dim/neg} T lymphocytes were present in both the CD45RO and CD45RA populations. The CD4⁺CMRF-35^{Bright} population was absent from cord blood T lymphocytes (Figure 1C).

15 Cytoplasmic labeling was performed on T lymphocytes to determine the presence of intracellular CMRF-35 antigen. Although 70% of peripheral blood T lymphocytes expressed surface CMRF-35 antigen, all T lymphocytes expressed cytoplasmic antigen.

The activated T cell line, Jurkat, expresses neither CMRF-35A or CMRF-35H mRNA nor
20 CMRF-35 surface molecules. When peripheral blood T lymphocytes are activated with PMA/ionomycin for 24 (or 48) hours, CMRF-35 molecules are induced on the cell surface. Upregulation of CMRF-35 cell surface molecules is evident on the CD4⁺ T lymphocytes from the CMRF-35⁺ and CMRF-35⁻ subpopulations.

25 CMRF-35 mAb binds to both the CMRF-35A and CMRF-35H molecules. The CMRF-35⁺ and CMRF-35⁻ populations of CD3⁺ T lymphocytes were sorted and analysed by RT-PCR for the expression of mRNA for CMRF-35A and CMRF-35H. Whilst the CMRF-35⁺ fractions of the sorted cells expressed mRNA for both molecules, the CMRF-35⁻ population expressed mRNA for only one transcript. The single transcript expressed
30 varied between samples.

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EXAMPLE 12

CMRF-35⁺ T lymphocytes are less responsive in an MLR than the CMRF-35⁻ T lymphocytes

5 A difference in function between the CMRF-35⁺ T lymphocyte population and the CMRF-35⁻ T lymphocyte population was assessed by the ability of each population to respond to Lin⁻HLA-DR⁺ stimulators in a MLR. The CD3⁺CMRF-35⁻ (Figure 2A), the CD4⁺CMRF-35⁻ (Figure xb) or the subpopulations showed a greater proliferative ability than the CD3⁺CMRF-35⁺ or CD4⁺CMRF-35⁺ populations of T lymphocytes. As the CMRF-35⁺ cells were prepared by positive selection, a control was used were mAb labeled cells that had been through the flow cytometer without sorting were compared to the sorted populations and unlabeled T lymphocytes. No significant difference was seen between the labeled and unlabeled T lymphocytes.

15

EXMAPLE 13

CD3⁺ CD4⁺ CMRF-35⁺ subset is less responsive to in vitro activation signals than the CD3⁺ CD4⁺ CMRF-35⁻ subset

The stimulator cells in the MLR were Lin-HLA-DR⁺ blood DC which are also CMRF-35⁺. In vitro activation of T lymphocytes was used as a single cell system thus removing any influence of CMRF-35 activity on the stimulators. Purified CD4⁺CMRF-35⁺ and CD4⁺CMRF-35⁻ populations of CD4⁺ T lymphocytes were activated in vitro with either PMA/ionomycin or immobilized CD3/CD28 mAb and compared to unfractionated T lymphocytes. The CMRF-35⁺ subset incorporated lower levels of [³H]-thymidine than the CMRF-35⁻ fractions or unseparated fractions (Figure 2B). Activation of the CMRF-35⁺ and CMRF-35⁻ populations was assessed by upregulation of CD25 and CD69. Whilst all populations appeared to show similar levels of CD69 upregulation after 24 hours (Figure 2C) when treated with PMA/ionomycin or immobilized CD3/CD28 the upregulation of CD25 differed between populations. The CMRF-35⁺ population upregulated CD25 to a greater extent than the CMRF-35⁻ population following treatment. Activation of the CMRF-35⁻ population was similar to activation of the unfractionated T lymphocytes.

EXAMPLE 14**Cytokine expression by CMRF-35⁺ activated lymphocytes**

5 The expression of cytokine mRNA in the MLR and *in vitro* activated samples were analyzed by quantitative RT-PCR. Following activation by either PMA/ionomycin or CD3/CD28 crosslinking, the CD4⁺CMRF-35⁺ T lymphocyte population expressed at least 3 fold more IL-2 mRNA than the CD4⁺CMRF-35⁻ populations. In addition, significantly more IFN γ mRNA was produced in the MLR between Lin⁻HLA-DR⁺ DC and CMRF-35⁺ T lymphocyte populations than in the MLR between Lin⁻HLA-DR⁺ DC and CMRF-35⁻ T lymphocyte populations or when unfractionated T lymphocytes were used as responders. This was particularly evident when compared to the level of expression of mRNA for the housekeeping gene, actin which was less for the CMRF-35⁺ responder population than the CMRF-35⁻ or unfractionated T lymphocyte responder population. In vitro activated lymphocyte populations showed a similar trend in which the CD4⁺CMRF-35⁺ T lymphocyte population expressed at least 2 fold more IFN γ mRNA than the CD4⁺CMRF-35⁻ population. Analysis of the cytokine production in the MLR indicated that there was very little IL-4 mRNA produced in these samples although there was some IL-10 produced.

20

The results of the RT-PCR detection of cytokines were confirmed by intracellular labeling. Purified CMRF-35⁺CD4⁺ and CMRF-35⁻CD4⁺ populations of CD4⁺ T lymphocytes were activated *in vitro* with either PMA/ionomycin or CD3/CD28 mAb and compared to unfractionated T lymphocytes and assayed for intracellular IL-4, IL-10 or IFN γ . Neither IL-4 nor IL-10 was detected in any *in vitro* activated population by intracellular labeling.

25

T lymphocyte populations were activated for 4 hour with PMA/ionomycin and then assayed for the presence of intracellular IFN γ (Figure 3C). The CD4⁺CMRF-35⁻ population expressed significantly less intracellular IFN γ than the CD4⁺, CMRF-35^{+/+}CD4⁺ and CMRF-35⁺CD4⁺ T lymphocyte populations. The percent of IFN γ expressing cells in the unseparated CD4⁺ T lymphocyte population was similar to that found in the

30

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unseparated CD4⁺ T lymphocyte population that had been labeled with the CMRF-35 mAb.

EXAMPLE 15

5 **Lack of proliferation of the CMRF-35⁺ CD4⁺ T lymphocytes is not due to cytokine deprivation**

CMRF-35⁺ and CMRF-35⁻CD4⁺T lymphocytes were activated *in vitro* in the presence of exogenous IL-2. As seen in Figure 2, the presence of excess IL-2 did not restore the
10 proliferative capacity of the CMRF-35⁺ CD4⁺T lymphocytes to that of the CMRF-35⁻ CD4⁺ T lymphocytes. Thus the lack of proliferation seen is not due to lymphokine deprivation.

EXAMPLE 16

15 **Lack of proliferation of the CMRF-35⁺ CD4⁺T lymphocytes is not due to a block in cell cycle**

In vitro activated CMRF-35⁺ and CMRF-35⁻ CD4⁺T lymphocytes were stained with propidium iodide and assessed for a change in DNA content indicative of a change in cell cycle. There were no significant differences in the DNA ratios between samples from any
20 population. Thus the difference in the proliferative capacity of the CMRF-35⁺ CD4⁺T lymphocytes compared to the CMRF-35⁻ CD4⁺T lymphocytes is not due to a block in progression through the cell cycle.

EXAMPLE 17

25 **The CMRF-35⁺ T lymphocytes undergo apoptosis**

In vitro activated CMRF-35⁺ and CMRF-35⁻ CD4⁺T lymphocytes were stained with annexin V-EGFP and propidium iodide and assessed for apoptotic cells. Following *in vitro* activation with either PMA/ionomycin or CD3/CD28, the CMRF-35⁺ CD4⁺ T
30 lymphocyte population was more susceptible to apoptosis than the CMRF-35⁻CD4⁺ T lymphocytes and range between 70-80% of the CMRF-35⁺CD4⁺ population compared to

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43-63% of the CMRF-35⁻CD4⁺ population. The differences in the susceptibility of the CMRF-35⁺ CD4⁺ T lymphocyte compared to CMRF-35⁻ CD4⁺ T lymphocyte to undergo apoptosis was apparent by 4 hours when PMA/ionomycin was used to activate the cells (Figure 4). Similarly activation with CD3/CD28 mAb caused an increase in the number of
5 cells undergoing apoptosis in the CMRF-35⁺ CD4⁺ T lymphocyte population compared to the CMRF-35⁻ CD4⁺ T lymphocyte population.

EXAMPLE 18

10 **Activated CMRF-35⁺ and CMRF-35⁻ CD4⁺ T lymphocytes have different cell surface phenotypes**

To determine if the increased cell death observed in the CMRF-35⁺ CD4⁺ T lymphocyte population was mediated by CD95/CD95L pathways, activated cells were stained for CD95 surface expression. Under these conditions cell populations that included CMRF-
15 35⁺ cells showed an upregulation of CD95 expression (Figure 5). Only the CMRF-35-CD4⁺ T lymphocyte population did not express any CD95.

EXAMPLE 19

20 **CMRF-35⁺ CD45RO⁺ CXCR3⁺ T cells are depleted from the peripheral blood of patients with psoriasis**

Using the above-identified methods, PBMCs were isolated from the peripheral blood of normal donors and patients with psoriasis, and the CD4⁺ T cells stained for CMRF-35 and CXCR3. Analysis demonstrated that the CMRF-35⁺/CXCR3 population of cells is
25 significantly reduced in the peripheral blood of patients with psoriasis, compared to normal controls (Figure 6).

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EXAMPLE 20**Screening CMRF-35^{Hi} in different disease states**

Populations of CMRF-35^{Hi} CD4⁺CD45RO⁺ peripheral blood cells were analysed in various disease states. The following diseases were tested: Breast, Multiple myeloma, Non Hodgkin's lymphoma, Rheumatoid arthritis, Thyrotoxicosis, SLE, IgA Nephropathy, Idiopathic Thrombocytopenia Purpura, Hashimoto's thyroiditis, Coeliac Disease and Graves Disease. There was no similar change in the CD4⁺CD45RO⁺⁺CMRF-35⁺⁺ population in any of these diseases as seen for psoriasis.

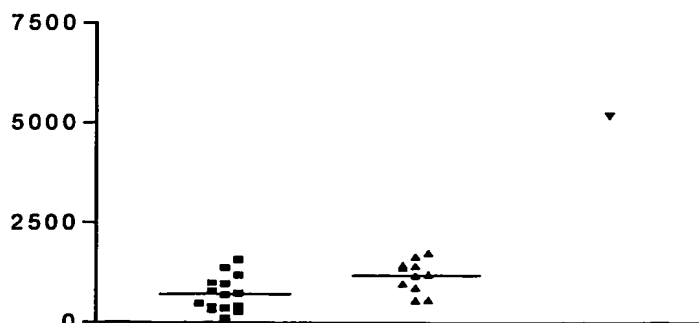
10

EXAMPLE 21**Analysis of psoriasis patients**

Sixteen psoriasis patients were tested for CMRF-35 expression. The expression of CMRF-35 on CD14⁺ monocytes appears to be approximately 50% the levels compared to the expression on normal CD14⁺ cells as measured by MFI on flow cytometry.

Table 4 shows the mean fluorescence intensity of CMRF-35 binding to CD14⁺ monocytes from peripheral blood for psoriasis patients (column 1) normal patients (column 2) and one extreme normal patient (column 3). PBMC were labeled with CMRF-35, PE-SAM and CD14-FITC.

Table 4
Data Table

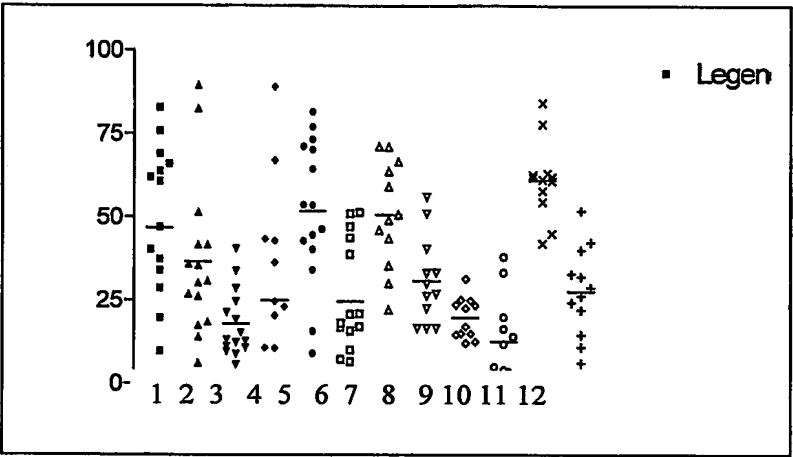


25

EXAMPLE 22
CMRF-35 mAb

The level of binding of the CMRF-35 mAb (MFI) to lymphocytes from psoriasis patients shows a great range than those from normal donors (Table 5).

Table 5
Data Table



1. -6 Psoriasis patients

7-12 Normals

1, 7 ; CD4+CD45RO+CMRF-35++
2,8; CD4+CD45RO+CMRF-35+
3,9; CD4+CD45RO+CMRF-35-
4,10 CD4+CD45RO-CMRF-35++
5,11; CD4+CD45RO-CMRF-35+
6,12; CD4+CD45RO-CMRF-35-

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described. It is to be understood that the invention includes all such variations and modifications. The invention also includes all of the steps, features, compositions and compounds referred to or indicated in this specification, individually or collectively, and any and all combinations of any two or more of said steps or features.

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BIBLIOGRAPHY

Biggs *et al.*, *Cytometry* 36: 36-45, 1999

Cantoni, *et al.*, *Eur J Immunol* 29:3148-3159, 1999

Clark, *et al.* *Tissue Antigens* 55: 101-109, 2000

Clark, *et al.*, *Tissue Antigens* 2001. 57: 415-423, 2001

Daish *et al.*, *Immunology* 79:55-63, 1993

Daneshvar *et al.*, *J. Immunol. Methods* 226(1-2): 119-128, 1999

Durig *et al.*, *J. Raman Spectrosc.* 24(5): 281-285, 1993

Eriksson *et al.*, *Biophys. J.* 2:64, 1993

Green, *et al.*, *Int Immunol* 10:891-899, 1998

Jackson, *et al.*, *Eur J Immunol* 22:1157-1163, 1992

Lakowicz *et al.*, *Biophys. J.* 72:567, 1997

Lewis *et al.*, *Dyes Pigm.* 42(2):197, 1999

Malemed *et al.*, "*Flow cytometry and sorting*", 2nd Ed., New York, Wiley-Liss, 1990

Rahman *et al.*, *J. Org. Chem.* 63: 6196, 1998

Rapaport *et al.*, *Appl. Phys. Lett.* 74(3): 329-331, 1999

- 102 -

Speckman, *et al.*, *Hum Genet* 4 112:34-41, 2003

Tawa *et al.*, *Mater. Res. Soc. Symp. Proc.* 488:885-890

Yin, *et al.*, *Immunol Cell Biol* 79:213-221, 2001

Youvan *et al.*, *Biotechnology et elia* 3:1-18, 1997